NOVEMBER, 1953

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GYNECOLOGY AND OBSTETRICS
Section

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INTERNATIONAL ABSTRACTS OF SURGERY

VOLUME 97 NOVEMBER, 1953 NUMBER 5

COLLECTIVE REVIEW

INGUINOPECTINEAL HERNIAS—A CLASSIFICATION AND CORRELATION

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WITH few exceptions, the standard classification of hernia has remained unchanged for several generations. This static condition is only true of the clinical aspect of hernias. In contrast, there has been a sustained and increasing interest in the surgical management of hernia. An abundance of evidence has accumulated reflecting progress, although intermittent at times, in our knowledge of reparative techniques in hernia. Paradoxical as it may seem, there can be little doubt that the profession has been dilatory in not reassessing the classification of hernia to determine whether its adequacy is commensurate with the advancing technical improvements. Obviously, such an attitude is a precarious one and a deterrent to advancement.

In our experience, totaling more than 5,000 hernia repairs, we have not infrequently encountered certain saccular and mural variants that could not be categorically placed in the standard and accepted classification of hernia (4). Actually, after consulting several textbooks on surgery, one finds the classification of hernia basically alike, often inadequate, frequently without anatomical correlation, and seemingly with little effort directed toward regional integration. Many terms have been applied to certain vulnerable regions such as the inguinal, pectineal, inguinopectineal, inguinohypogastric, inguinal trigone, and "inguina," which are vague, and often their definitive boundaries cannot be found in anatomical texts. General agreement on a universally acceptable name for these more or less identical regions with discontinuance of the many synonyms presently in use would be very helpful. Such an agreement should preferably preclude the revised classification of hernia. In short, there is definite need for a composite as well as a more detailed classification of hernia. By composite is meant the collective inclusion of those hernias occurring in a sizable anatomic unit and corresponding for the most part to the hernia-bearing area of the abdominopectineal region. Such a unit we have designated as the "abdominopectineal trigonum" (Fig. 1C). It is bounded medially by the urachus, or middle umbilical ligament, inferiorly by the posterior iliopubic (Cooper's) ligament and the spinoeminential line, and superolaterally by the spinoumbilical line. The rationale for selecting this major composite vulnerable region is that it includes the inguinal, inguinopectineal, ventral inguinal regions, the inguinal fossae, and, for the most part, the inferior half of the semilunar line.

Another factor confronting us and giving impetus to the need for providing a more accurate guide to the diagnostic classification of hernia is the increasing alertness of surgeons. Meticulous operators are constantly making more careful observations and, as a result, are encountering more saccular variants than formerly, and, consequently, are faced with the dilemma of being unable to classify some of them properly because certain hernias may begin as internal types and become manifest as external types or the converse may

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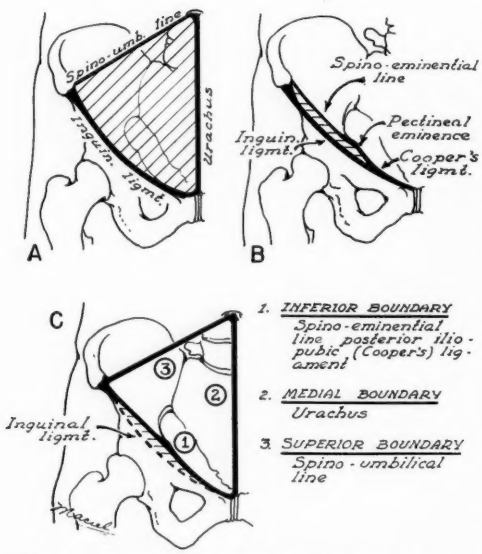

Fig. 1. The hernia-bearing region of the lower abdomen in which three trigonums are considered. *A*, The lower abdominal trigonum which is bounded medially by the urachus, inferiorly by the inguinal (anterior iliopubic) ligament, and superolaterally by the spinoumbilical line. *B*, The inguinopectineal trigonum which is the smallest and actually corresponds to the interligamentous space. It is bounded superiorly by the inguinal (anterior iliopubic) ligament, inferiorly by Cooper's (posterior iliopubic) ligament and posteriorly by the spinoeminential line. *C*, The abdominopectineal trigonum which is the largest and the all inclusive trigonum. It is bounded medially by the urachus, superiorly by the spinoumbilical line and inferoposteriorly by Cooper's ligament and the spinoeminential line.

obtain. Similarly, it has been noted that these variants are more widely distributed anatomically than was recognized at the turn of the century. There is also fairly general agreement that an acceptable classification of hernia should take into consideration the number of saccular loculations, their independency or communication with each other, their relation to the inguinal canal, to the inguinal fossae, and to the parietal strata. Therefore, in order to fulfill the criteria for an adequate or composite classification of hernias of the abdominopectineal trigonum, they are divided according to: (A) their relation to the inguinal canal, (B) their relation to the inguinal fossae, and (C) their relation to the parietal strata.

CLASSIFICATION OF HERNIAS IN RELATION TO THE INGUINAL CANAL

Those hernias which protrude through the internal ring or posterior wall of the canal are classified as canalicular; those hernias arising adjacent to the canal are designated paracanalicular.

Canalicular Hernias (Fig. 2). The first hernias to be recognized clinically were those which were directly related to the spermatic cord and/or the inguinal canal. Since the hernias of the inguinal canal exceed in number all others combined, it has become almost universal practice to think of hernias as being canalicular unless otherwise qualified. With the introduction of the modern surgical operation for the treatment of hernia (which dates back to the Bassini-Halsted era), the initial concept of hernia has not been altered and hernia has continued to be thought of almost exclusively in its relationship to the spermatic cord and/or the posterior wall of the canal. Although the profession has been quite receptive to newer techniques of repair, it has been reluctant to forego its original ideas or to expand its concept of the classification of hernia appreciably.

When hernias are limited exclusively to their relationship to the inguinal canal, the following types are generally recognized: indirect, direct, indirect-direct (bilocular), sliding, diverticular, adipose, and lateral vesical.

(a) An indirect hernia follows the course of the spermatic cord and is adherent to its anteromedial aspect. It is called indirect because of the obliquity of its course through the transparietal portion of the inguinal canal, which distinguishes it from those hernias which protrude directly through the floor of the canal. An indirect hernial sac is

Canalicular
- (a) Indirect
- (b) Sliding: Intrasaccular, Parasaccular, Sacless, Peritoneal
- (c) Direct: Peritoneovesical, Vesical
- (d) Indirect—Direct (bilocular): Communicating
- (e) Diverticular: Noncommunicating, Adipose
- (f) Lateral vesical (supravesical fossa)

Paracanalicular
- (a) Semilunar line: Interfascial, Interaponeurotic, Junctional (semicircular and semilunar lines), Prevascular, Transitional space
- (b) Interligamentous: Femoral, Pectineal, Translacunar

the unobliterated portion of the processus vaginalis which may extend a variable distance along the cord until occasionally it reaches the normally descended testis. Characteristically, the neck of an indirect sac enlarges at the expense of the posterior wall of the canal with a concomitantly greater dimension of the abdominal ring. The chief barrier to the medial expansion of the neck of the sac is the interfoveolar or lateral ligament of inguinal canal which contains bands of fascia transversalis, the inferior epigastric vessels, and, frequently, the fascicular fibers of the transversus abdominis. Some indirect sacs are cylindrical with a small neck and may retain this configuration indefinitely.

There is an impression that all indirect hernias are easy to repair, which, unfortunately, is true only of the smaller tubular sacs without concomitant dilatation of the internal ring or weakness of the parietal wall. Large indirect hernias present just as formidable reparative obstacles as large direct hernias. The incidence of indirect hernia is variously reported, but certainly this is the most frequently encountered hernia.

(c) A direct hernia presents as a domelike bulging through the posterior wall of the inguinal canal medial to the inferior epigastric vessels. Aside from the more medial position of the herniation, it is distinguishable from indirect hernia by the fact that it is primarily mural in origin and, except in the vesical type, the sac morphologically conforms to the increasing congenital weakness of the posterior wall of the canal because of its ductility. Its neck is quite wide and, occasionally, may not be recognizable because of the gradual transition. For the same reason, a direct hernia almost never becomes incarcerated or strangulated.

There are three types of direct hernias: those in which the sac is unrelated to the bladder wall, those in which the sac is adherent to the bladder for a variable distance, and those in which the herniation is exclusively bladder. In our experience, approximately 50 per cent of the direct hernias were of the combined type and required freeing from the vesical wall in order that the sac could be mobilized entirely. It is not possible to differentiate these saccular variants accurately before operation. Since it is not possible by physical examination to elicit pulsations in the inferior epigastric artery, one cannot differentiate direct from indirect hernias with certainty prior to visualization of these vessels at operation notwithstanding statements to the contrary in some texts. Certain maneuvers have been described and illustrated by Andrews and Bissel which purportedly are of diagnostic value in determining the relationship of the

Fig. 2. Hernias in relation to the inguinal canal. Canalicular hernias. These include those that make their exit through the abdominal ring or posterior wall of the inguinal canal. The indirect, indirect-direct, direct, diverticular, adipose, and sliding types are illustrated. The last type is composed of intrasaccular, parasaccular, and sacless variants.

hernial sac to the inferior epigastric vessels, but in our experience they have been disappointing. However, at operation, indirect and direct sacs are easily recognizable.

(d) An indirect-direct hernia. A coexisting indirect-direct sac has an incidence approaching 50 per cent of the clinically diagnosed indirect hernias according to statistical studies in our clinic. The recognition of a bilocular sac is important because it is essential that the sac be completely mobilized. The herniation at the abdominal ring is always approached first to free the indirect locule and gradually the direct component is recognized and dissected from the surrounding structures, which permits complete exposure of the sac and its converted loculations so that total ligation is done under direct vision. By consistent use of this maneuver, there is less likelihood of overlook-

ing a direct or a properitoneal component with a possible subsequent so-called recurrence, in reality, a persistent hernia because of incompleteness of the primary operation.

The terms "saddlebag," "pantaloon," and "bilocular" are used synonymously; however, we prefer the term "indirect-direct" as more accurately expressing the anatomic relation of the combined or coexisting sacculation. Incidentally, we have adopted the practice of using "indirect-direct" when the principal component is indirect and "direct-indirect" when the converse obtains. The necessity of including this saccular variant in the classification of hernia is due to the fact that both components have been recognized as separate entities. However, in the interest of furthering more meticulous dissection of the sac, and since recognition of the sac is conducive to thoroughness of the repair, one is justified in considering the bilocular sac as an entity.

(b) Sliding hernia. From the standpoint of the exit and course of a sliding hernia, it is not unlike an indirect hernia, but its saccular characteristics differ decidedly from the former. Instead of there being a complete sac, the bowel forms part of the wall. On the basis of the variability of its aperitoneal portion, sliding hernia has been classified as intrasaccular, parasaccular, and sacless, or it has been classified on the basis of which organ (cecum, sigmoid, or bladder) has been involved (Bevan). Therefore, a sliding hernia is the most deceptive and serious, one of the rarest (1 to 2 per cent) and perhaps the most difficult to repair. Its seriousness arises from the fact that the bowel may be inadvertently opened, its circulation may be impaired during mobilization of the loop of the bowel and peritonealization of its bare area, or a certain amount of trauma to the bowel may result from manipulation and dissection. In the parasaccular type, it may be necessary to section the peritoneum on either side of the bare area and suture the reflected peritoneal flap posteriorly, which completely invests the bowel with peritoneum. This also permits reduction of the bowel and allows high ligation of the sac. One should be careful to avoid constriction of the bowel in the latter maneuver. In the sacless type, complete serosal coverage may not be possible. A celiotomy may be necessary to permit cecopexy or colopexy. Following reduction of the sliding component and ligation of the sac, the repair of the wall must be done; this procedure depends upon the type of existing mural weakness, but in most instances Cooper's ligament technique is required.

(c) Diverticular hernia. Insofar as the canalicular position of a diverticular hernia is concerned, it is medial to the inferior epigastric vessels. Therefore, according to the older standards of classification, it would be a variant of a direct hernia rather than a distinct entity. However, it has many definitive characteristics that set it apart from direct hernia. Diverticular hernia occurs in the cranial portion of the canal medial to the epigastric vessels, near the pubic spine. Usually it is just lateral to the edge of the ligamentum inguinale reflexum in the area of Henle's ligament, when present. In the absence of the latter the posterior wall is thinner at this point and predisposes to the development of a rent in the fascia transversalis. A diverticular hernia is always small, its neck narrow, and the aperture in the wall quite distinct; in a direct hernia the bulging is dome-shaped, there is a wide-necked sac, and a lack of firmness of the floor which cannot be definitely felt. Burton and Blotner, in their study of 2,302 primary hernias, found that the sac of a diverticular hernia may communicate with the peritoneal cavity (53%); in some instances it may become occluded at its neck (41%), and, occasionally, the hernia is adipose (5%). Because of the narrowness or occlusion of the saccular neck, an impulse on coughing may not be perceptible, whereas an impulse in a direct hernia is quite pronounced. Consequently, a preoperative diagnosis of diverticular hernia is difficult to make although the hernia is quickly recognized on exposure of the canal. The hernia is relatively asymptomatic unless it coexists with other hernial sacs. Its chief importance is that it may be overlooked at the primary operation. Therefore, the finding of a diverticular hernia at the second operation poses the question of persistent versus recurrent hernia. Apropos, in a series of 130 recurrent hernias which we studied, the incidence of diverticular hernia was 13.8 per cent, whereas the incidence in a series of 2,302 primary hernias was 2.6 per cent (6). Therefore, with such a decided difference in the incidence of diverticular loculations between primary and recurrent hernias, it is difficult to escape the conclusions that diverticular hernias are frequently not recognized and consequently no steps are taken to repair them at the initial operation. This is another cogent reason for meticulously freeing the entire sac routinely. This maneuver alone, if followed assiduously, would reduce appreciably the recurrence rate of hernias. It is well to remember that a diverticular hernia may be referred to as a lateral vesical hernia as it lies in the supravesical fossa and, consequently, is medial to the lateral umbilical ligament.

Hernia adiposus. This type of hernia is unique in that its diagnosis is made by exclusion and we

invariably refrain from such a diagnosis as long as a hernial sac is demonstrable. In our experience it was noted twice in an earlier series. The presence of an oval projection of fat through the abdominal ring along with, but considered apart from, the spermatic cord constitutes an adipose hernia only after careful search has revealed the absence of a sac. There may be some descent of the fatty mass on coughing which may be erroneously interpreted as an impulse. I presume, if one wished to be supercritical, there might arise some misgivings as to the propriety of designating this funicular lobulation of fat a hernia, since it actually does not represent a saccular entity. However, for the sake of thoroughness, and in keeping with the views of some authorities, it is believed that hernia adisposus should be retained in the classification of hernia.

(f) Lateral vesical hernia. The inclusion of lateral vesical hernia in the classification of canalicular hernias may seem like a radical departure from established custom. Yet, upon reflection, it can be shown that a supravesical internal hernia may evaginate through the medial posterior wall of the canal and thus become manifest as an external hernia. The evolution from an internal hernia to an external one or the converse seldom occurs but the former type has been reported by Reich.

A precise diagnosis of an external lateral vesical hernia antedating operation is almost impossible. However, if the surgeon is aware of the possibility that this type of hernia can evaginate through the medial inguinal canal, he should not find it difficult to recognize its existence. If in the mobilization of the hernia, it is found to arise from the supravesical fossa rather than laterally in the direction of the abdominal ring, there should be no problem regarding its exact origin and identity.

Paracanalicular hernias (Fig. 3). Perhaps 90 per cent of all inguinal hernias fall within the herein described concept of canalicular hernias with paracanalicular hernias accounting for 6 to 7 per cent. Although the latter are comparatively rare, if they were completely overlooked the additional 6 per cent superimposed on the present recurrence rate would constitute an important etiological source of recurrence. Since the goal of surgery is the cure of all hernias, it is of utmost importance that we recognize these extracanalicular hernias and apply recognized available surgical procedures for their repair.

For the purpose of discussion, it is proposed that paracanalicular hernias be divided into: (a) semilunar line hernias, and (b) interligamentous hernias.

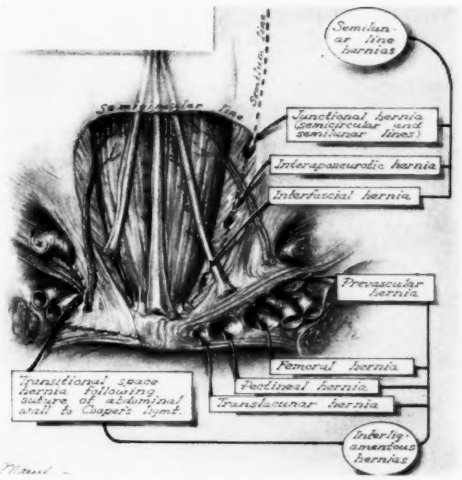

Fig. 3. Hernias in relation to the inguinal canal. Paracanalicular hernias. These hernias evaginate parajacent to the inguinal canal and may be divided into semilunar line hernias and interligamentous space hernias.

Hernias through the semilunar line include interfascial and interaponeurotic hernias, and hernias occurring at the junction of the semilunar and semicircular lines. Hernias emerging through the interligamentous space comprise translacunar, pectineal, femoral, and prevascular hernias.

(a) Semilunar line hernias. The semilunar line is a fascioaponeurotic plate of variable width and thickness paralleling the rectus sheath. Anson's Atlas depicts quite well the laminal variants and their relation to the semicircular line. River considers the semilunar line as the transition between the muscle bundles and the aponeurosis of the transversus abdominis. There is fairly uniform agreement that, beginning just cephalad to the semicircular line, the bilaminar relationship usually obtains. However, caudad to the semicircular line, a single stratum, the transversus abdominis aponeurosis, is the only constituent of a rather wide fascial expansion extending from the cranial portion of the canal to the edge of the sheath of rectus, which corresponds to the medial third or half of the inguinal canal. The upper third of the semilunar line is narrower and it has a more intimate fascicular relationship.

On the basis of anatomical predispositions or structural aberrancies of the semilunar line, hernias through these areas have been designated interfascial, interaponeurotic, and occurring at the junction of the semilunar and semicircular lines (Fig. 3). It would seem that the proposed classification which excludes proper names is more anatomical and descriptive than that which refers

to all hernias through the semilunar line as Spigelian hernias, a classification that many surgeons are prone to use.

Interfascial and interaponeurotic semilunar line hernias are medial to hernias emerging through the posterior wall of the inguinal canal. The former emerge through the thinner fascial portion of the semilunar line inferior to the lateral umbilical ligament; the latter appear superior to the ligament and make their exit through the denser aponeurotic component. A semilunar line hernia may occasionally emerge slightly lateral to the laminal conjunction, in which instance it would become lodged between the strata and constitute an interparietal hernia. The junction of the semilunar and semicircular lines, the level of which is variable, may be the site of a herniation. Wherever there is structural transition, there is concomitant predisposition to developmental weakness and consequent herniation.

Since semilunar line hernias are rarely encountered, they are, as a rule, not recognized as such clinically, with the result that their true identity is often not discovered until exposure of the hiatus at operation. With few exceptions, semilunar line hernias cannot be convincingly shown to have a sound embryonal basis for their occurrence in the sense of a pre-existing embryonal remnant. This is in contrast to the universally recognized congenital origin of canalicular hernias. However, if considered in the sense of undemonstrable predispositional mural weakness, such as focal thinness of the aponeurotic semilunar plate perhaps due to sparcity of the intercrural fibers or to projected embryonal interfascicular weakness, one cannot totally exclude the congenital but delayed origin of these hernias.

Still another possibility of the congenital origin of semilunar line hernias is based upon the segmental development of the parietal muscles which is macroscopically demonstrable in the fetus. One can theorize that the intersegmental sulci, although seldom recognizable in the adult, may offer an explanation for attenuation of the aponeurosis of the semilunar line. Some authorities have advanced the possibility that the vascular channels may provide the focal point of exit, but by no means is this theory generally accepted.

A semilunar line hernia may have a peritoneal sac and communicate with the peritoneal cavity but its neck may be constricted or even occluded. A third variant occurs in which the hernia consists of adipose tissue with a thin envelope of connective tissue. It is therefore understandable why hernias through the semilunar line often do not transmit a succussion on coughing. Similarly, some of these hernias may not be reducible. Zimmerman and his coworkers have described an unusual type of lipomatous bulging coming through abnormal bandings of the obliquus internus, which again raises the question as to the genesis of these hernias. Such a hernia would conceivably be difficult to diagnose but would be lateral to the semilunar line.

(b) Interligamentous hernias. The vulnerability of the inguinopectineal space, which lies between the anterior iliopubic (inguinal) ligament and the posterior iliopubic (Cooper's) ligament, has only been recognized and the significance of its clinical importance emphasized during the past 2 decades. There is one exception; femoral hernias which emerge through the most susceptible weakness, the femoral ring, were known contemporarily with canalicular hernias. It is therefore hard to understand the advanced progress made in the treatment of canalicular hernias in contrast to the apparent vacuum existing in our knowledge with regard to the various types of interligamentous hernias. Their rarity is only a partial and not an adequate explanation for the paucity of our knowledge in this respect. One might postulate another reason for the active versus the static concept of these two groups of hernias. The repair of hernias of the inguinal canal is a relatively simple procedure in which only a single structural plane is employed; however, the repair of interligamentous hernias requires that three dimensions must be considered. Moreover, in the latter, the structures are anchored much deeper, which requires more surgical training, experience, and judgment. Therefore, a decade or two ago many surgeons would have felt competent to do an inguinal ligament repair but would have been reluctant to undertake the deeper Cooper's ligament repair. Consequently, there was much more material published by surgeons on hernias limited to the inguinal canal.

At the Veterans Administration Hospital, Dayton, Ohio, 117 interligamentous hernias were collected from a consecutive series of 4,400 inguinal hernias operated on from 1934 to 1949, an incidence of 2.6 per cent. Since the patients were all males, perhaps the incidence would have been greater had the patients included a representative number of women.

These hernias were classified as: (1) lateral inguinopelvic or lateral vascular, (2) prevascular, (3) femoral, (4) pectineal, (5) translacunar, and (6) multidiverticular, the latter signifying simultaneous herniations through the interligamentous space, which in reality corresponds to the inferior plane of the trihedral space. Hernias occurring in

the lateral inguinal region, and consequently lateral to the external iliac vessels, are usually similar to direct hernias in that the bulging is more a mural weakness rather than a well defined defect in the wall. This type of herniation is superior to the inguinal ligament. It should be realized that the diagnosis of such a hernia will require experience in the interpretation of findings, which may resemble a pseudo or ptoticlike weakness, and, therefore, may very well precipitate differences in opinion. A prevascular protrusion insinuates itself in front of the external iliac vessels and beneath the inferior edge of the inguinal ligament. It is not necessary to elaborate on femoral hernias except that one should limit them to only those which escape through the femoral ring. Unfortunately, some surgeons are prone to lump all hernias through the interligamentous space under the term "femoral."

The distinguishing features between a pectineal and a translacunar hernia are that the former is domelike and diffuse because of attenuation of the entire medial lacunar ligament, while the latter evaginates through a rent in the ligament and is therefore smaller and more difficult to diagnose. By keeping in mind these clinical characteristics, it is possible to make a correct preoperative diagnosis; this has been done a few times in our clinic.

Hernias through the interligamentous space have been shown to be closely related peritoneally and murally to direct and indirect hernias, and not infrequently they coexist. In order to achieve uniform security of the wall and to evaluate canalicular and paracanicular herniations properly, it is strongly recommended that a uniform approach be used. In all interligamentous hernias a composite Cooper's ligament repair should be performed. In our hands this technique has resulted in the lowest percentage of recurrence.

With regard to the second major category in this discussion on the classification of hernias, it is proposed to direct attention to the role of the inguinal fossae. Most textbooks on surgery barely mention the fossae, devoting perhaps a paragraph or two to them without giving a clear, concise description, and the anatomical texts contain but little additional information. Therefore, with such meager, and often controversial, information regarding the fossae, one is led to believe that they are legendary, have little or no practical value, and should be ignored. In contrast, we should like to take an affirmative attitude toward these fossae and declare their importance anatomically, clinically, and surgically. This reasoning is based upon the fact that, unless he is familiar with the anatomical boundaries of the fossae, the surgeon may be misled or become confused as to the correct identity and origin of some hernias. For instance, a hernia through the floor of the inguinal canal may evaginate medially to the supravesical or paravesical space, as exemplified by the case

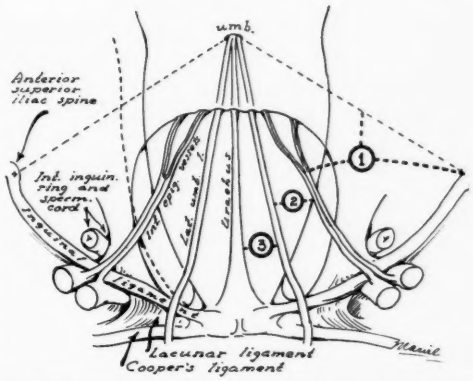

Fig. 4. The inguinal fossae and their anatomical limits. *1*, The lateral, or external, inguinal fossa; *2*, the middle inguinal fossa, and *3*, the medial, internal inguinal, or supravesical fossa.

CLASSIFICATION OF HERNIAS IN RELATION TO THE INGUINAL FOSSAE

Lateral or external inguinal fossa
- (a) Indirect
- (b) Interfascicular (ventral inguinal)
- (c) Junctional: semicircular and semilunar lines
- (d) Lateral vascular (iliopsoas)
- (e) Prevascular
- (f) Transitional space

Middle inguinal fossa
- (a) Direct: Peritoneal / Peritoneovesical / Vesical
- (b) Direct component of bilocular sac
- (c) Interaponeurotic
- (d) Femoral

Medial, internal or supravesical inguinal fossa
- (a) Pectineal
- (b) Translacunar
- (c) Interfascial
- (d) Diverticular: Communicating / Noncommunicating / Adipose
- (e) Hypogastric
- (f) Intravesical
- (g) Prevesical
- (h) Paravesical
- (i) Lateral vesical (may be either internal or external)

(a)–(d): External hernias; (e)–(i): Internal hernias

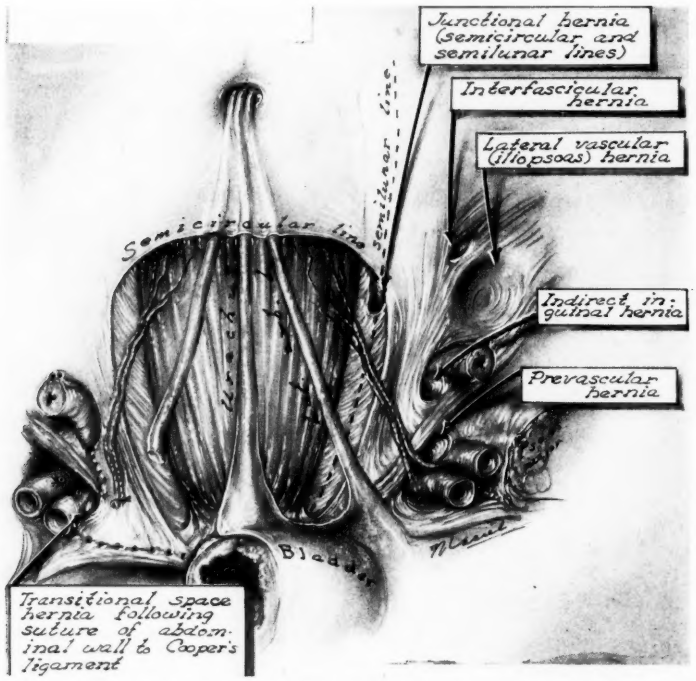

Fig. 5. Hernias in relation to the inguinal fossae. Anatomical relationships of hernias of the lateral or external inguinal fossa are shown. These hernias include junctional hernia in the semilunar line; interfascicular, or spontaneous, ventral hernia; lateral vascular, indirect, and prevascular hernias. In other words, hernias of this fossa include canalicular and paracanalicular hernias lateral to the inferior epigastric vessels.

reports of Makin, Parise, and Oberst. Conversely, hernias arising in the supravesical fossa as internal hernias may burrow laterally through the inguinal canal and become manifest externally as direct, femoral, or possibly obturator hernias. If for no reason other than precise diagnosis of the hernia, a working knowledge of the fossae may be of signal importance, and it may play a role in prognosis. In any patient presenting symptoms of small bowel obstruction with localizing symptoms in the pelvis, particularly if associated with bladder irritability, the possibility of an incarcerated or strangulated internal supravesical hernia should be considered. Moreover, the surgical approach for the treatment of the hernia will depend to some degree on the operator's knowledge of the anatomy of the fossae as well as the commonly projected course of the hernia. A thorough understanding of the fossae and their integration with posterior wall canalicular weaknesses creates a stereoscopic concept of hernia which is not thought of when these factors are considered independently.

The composite hernia-bearing region of the lower abdomen, which we have designated as the abdominopectineal trigonum (Fig. 1), is divided into three fossae: (1) lateral or external inguinal, (2) middle inguinal, and (3) internal inguinal or supravesical (Fig. 4).

The lateral, or external, inguinal fossa is limited laterally by the spinoumbilical line which extends from the anterior superior spine of the ilium to the umbilicus (Fig. 4). The inferior epigastric vessels form the medial boundary of the fossa, and inferiorly this fossa is limited by the posterior third of Cooper's ligament and by the junction of the psoas fascia with the recurved portion of the inguinal ligament which overlie the spinoeminential line.

The herniations which occur in this fossa are indirect, interfascicular, or spontaneous ventral inguinal, junctional at the semicircular-semilunar lines, lateral vascular or iliopsoas, prevascular,

and transitional (Fig. 5). Indirect hernia is the most common and is also a canalicular hernia with which every one is quite familiar. Interfascicular hernia has been attributed to abnormal banding or perhaps to embryonal arrest in the segmental evolution of the internal oblique muscle. Occasionally these hernias are referred to as spontaneous ventral hernias. They are confined to the area of the parietal wall, being laterally adjacent to the semilunar line and superolateral to the abdominal inguinal ring. Wherever there is a transitional change from one stratum to another, there is a predisposition to a developmental fault. This is exemplified by the hernias which occur at the junction of the semicircular and semilunar lines. This laminal transition, which has long been an important landmark, happens at a variable distance below the umbilicus. A lateral vascular or iliopsoas fossa hernia is a pseudo or relative weakness of the wall in contrast to a defect which may occur as a spontaneous bulging anterior to the iliac fossa. Lateral vascular hernia differs from most hernias in that it has no ring. In this respect, it is like direct hernia. Iliopsoas or lateral vascular hernia is most commonly encountered in the asthenic or ptotic individual. In the event that there is coexisting laxity of the posterior edge of the inguinal ligament and adjacent portion of the intermediate iliopubic ligament overlying the external iliac vessels, a protrusion may insinuate itself through this vulnerable area and constitute a prevascular hernia. When a three dimensional repair has been performed with Cooper's ligament as a pivotal anchorage of the parietal wall, the interligamentous portion of the transitional space becomes a potential weakness. This transitional space extends from Cooper's ligament to the abdominal ring. It consists of a transinterligamentous and a transparietal component. The former is vertical, which, in reality, is the distance between Cooper's ligament and the inferior edge of the inguinal and intermediate iliopubic ligaments at the medial boundary of the transvascular space. The parietal component of the transitional area extends from the recurved portion of the inguinal ligament to the abdominal inguinal ring. In other words, the transparietal component is the superficial portion of the repaired parietal wall. The transitional space is more conspicuous in a Cooper's ligament repair. A hernia through this space constitutes a transitional hernia. Therefore, a transitional hernia is a recurrent hernia and can only follow a Cooper's ligament repair. It should be noted that hernias of the external inguinal fossa also include those canalicular, semilunar line, and interligamentous hernias

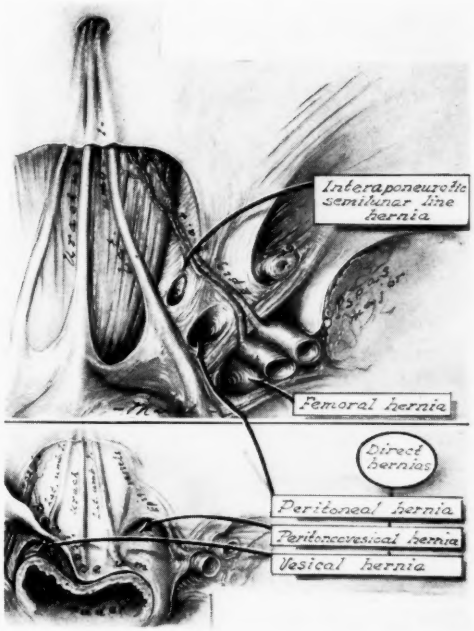

Fig. 6. Hernias in relation to the inguinal fossae. The middle inguinal fossa. This fossa is the smallest, but it is important because of the relative frequency with which hernias occur within its boundaries. The interaponeurotic hernia in the semilunar line and various types of direct hernias which are canalicular and interligamentous femoral hernias are illustrated.

which make their exit lateral to the inferior epigastric vessels.

The middle inguinal fossa (Fig. 4) comprises the intermediate zone of the inguinal region. It lies between the inferior epigastric vessels and the lateral umbilical ligament with its inferior and posterior limit at Cooper's ligament. Since its lateral and medial boundaries are easily displaceable, the size of the fossa is quite variable. Yet, despite the feature of variability, the potential herniations through this fossa are not altered (Fig. 6).

The most frequent hernia appearing in this fossa is the direct inguinal hernia, which, coincidentally, is a canalicular hernia. The peritoneovesical and vesical types of direct hernias may occasionally migrate to the supravesical fossa, and, if they did, they would become internal hernias. The direct component of a bilocular sac is in the middle fossa.

An interaponeurotic hernia occurs through the denser portion of the semilunar line, superior to

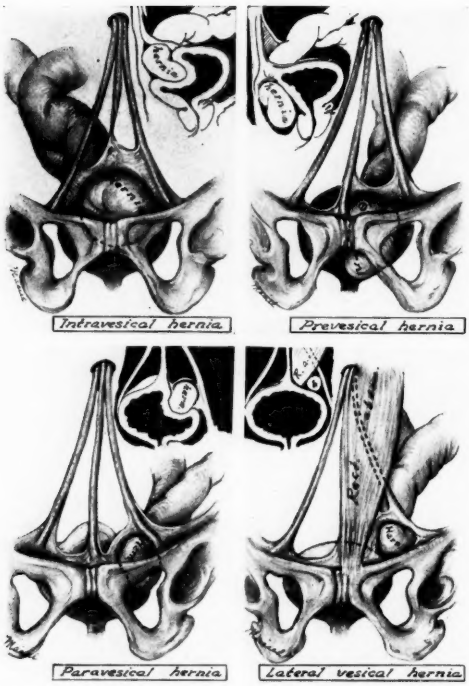

Fig. 7. Hernias in relation to the inguinal fossae. Medial, internal, or supravesical inguinal fossa. Internal hernias. The internal hernias of the supravesical fossa are: intravesical, which produce a pressure concavity of the superior wall of the bladder; prevesical hernia which is a herniation into the prevesical space (Retzius); paravesical, in which the hernia insinuates itself into a peritoneal pocket along the side of the vesical wall; and lateral vesical hernia which means an evagination through the lateral vesical triangle. The latter is bounded by the rectus muscle medially, Cooper's ligament inferiorly, and the obliterated hypogastric remnant laterally.

the crossing of the lateral umbilical ligament, but it may be either inferior or superior to the semicircular line. However, it is not etiologically related to junctional hernia. The genesis of interaponeurotic hernia remains obscure. There are no vascular channels or any embryonal departures which could reasonably be advanced as causative factors. One might incriminate developmental laminal deviations but the opportunity to prove such a deduction is extremely rare. The term "pararectus hernias" has been applied to incisional hernias occurring at the lateral border of the rectus sheath, not necessarily in the semilunar line, but which are usually inferior to the semicircular line. It may be mentioned that in the repair of the latter type of hernias, and perhaps certain semilunar line (Spigelian) hernias, a segment of the rectus sheath may be reflected and displaced posterior to the muscle, but it should remain pedicled at its medial border. It is sutured to the stronger conjoined structures laterally, bridging or reinforcing the weakness.

Femoral hernia. The femoral ring through which a femoral hernia escapes is just medial to the origin of the inferior epigastric vessels and is therefore in the middle inguinal fossa. However, it should be emphasized that in large indirect hernias, the epigastric vessels may be displaced medially to almost the pubic tubercle. Consequently, under such circumstances a paradoxical situation seemingly obtains: the herniation may actually be manifest lateral to the displaced inferior epigastric vessels.

Femoral hernia is the most frequently encountered interligamentous hernia, occurring in 70 per cent of one series of cases. In the mobilization of a femoral loculus, the classical inguinal approach is always employed. After the peritoneum is opened at the abdominal ring, the femoral sac is withdrawn into the inguinal canal, or inguinalized, after which the direct component from which the femoral sac arose is indirectalized. In other words, a femoral hernia is first inguinalized and then indirectalized, which illustrates the interrelation of interligamentous femoral hernia to canalicular direct and indirect hernias, and, in turn, the relationship of these hernias to the middle and external inguinal fossae.

The medial, internal, or supravesical inguinal fossa (Figs. 4 and 8) is considered the most important fossa, yet of the fossae in the inguinohypogastric region, it is the least understood surgically and anatomically. Because the hernias of this fossa only exceptionally become external by burrowing their way inferiorly or laterally and appearing in the medial angle of the inguinal canal, they are infrequently recognized and ordinarily not included in the classification of inguinal hernias. Another reason why surgeons are loath to discuss hernias of this fossa is the chaos existing from the galaxy of synonyms by which the fossa is known. Warvi and Orr reported as many as 22 different names for this fossa. Is it any wonder that one fears to tread in this area which is characterized by such a lack of unanimity in nomenclature? For instance, a supravesical hernia may imply either a hypogastric external hernia suprajacent to the fundus of the bladder, a lateral vesical external hernia, or a composite term for any internal hernia of the supravesical fossa (Figs. 7 and 8).

The variation in classification of hernias of the internal inguinal, or supravesical fossa is attributed to: (1) variations in anatomical terminology, (2) the general acceptance of two major types of hernia, internal and external, (3) the variability of the level of its base and the displaceability of the lateral boundary, (4) the failure to recognize that some hernias may be combined, arising initially as an internal hernia in one fossa and evaginating as external hernias in an adjacent fossa, and (5) the erroneous concept that inguinohypogastric hernias are not related to supravesical fossa hernias; instead, the inguinohypogastric region should be considered a composite anatomic unit, synonymous with the abdominopectineal trigonum which contains the inguinal canal, inferior half of the semilunar line, the interligamentous space, and the three inguinal fossae.

Anatomically, the supravesical fossa is vertically triangular with its apex at the convergence of the lateral umbilical ligaments, which is at the umbilicus, and its rather long lateral boundaries limited by the same diverging anatomic structures as they descend obliquely and inferiorly toward the hypogastric region (Fig. 4). The reflected peritoneum from the anterior abdominal wall over the superior surface of the bladder has been accepted by most authorities as forming its base or inferior boundary. However, Pick differs with this view in that he believes the base should continue into the pelvis to the point where the lateral umbilical folds blend with the pelvic peritoneum. The latter concept would include the rectovesical or vesicouterine fossa.

The urachus, or middle umbilical fold, which is constant and unvarying in its position, divides the supravesical fossa into a right and left half. Because of the ease with which the hypogastric remnants are displaced by the distensibility of the bladder, the internal fossae are quite variable in size, but with a mean considerably larger than the middle or lateral fossae.

Hernias of the supravesical fossa may be either internal, external, or combined. Ordinarily, when referring to supravesical hernias, it is implied that they are closely related to the bladder and they are classed as internal. The internal hernias of this fossa include intravesical, prevesical, and paravesical hernias (Fig. 7). When an intravesical hernia becomes engaged in a peritoneal pocket through a rent in the urachus, it produces an indentation or concavity in the apex or fundus of the bladder which is the superomedial portion of the supravesical fossa. This type of hernia is perhaps the rarest among the internal hernias of this region. There is no record of such a hernia in our series of more than 5,000 hernia operations. Prevesical hernia occurs inferomedially, or in what is more commonly recognized as the space of Retzius. Characteristically, no pressure defect of the vesical wall is noted in this type of hernia. A paravesical hernia lodges in a peritoneal pouch of the lateral wall of the bladder and is only diagnosed on the operating table because of an incarcerated or strangulated loop of bowel caught in it. Two such hernias were present in our series, but were not diagnosed preoperatively.

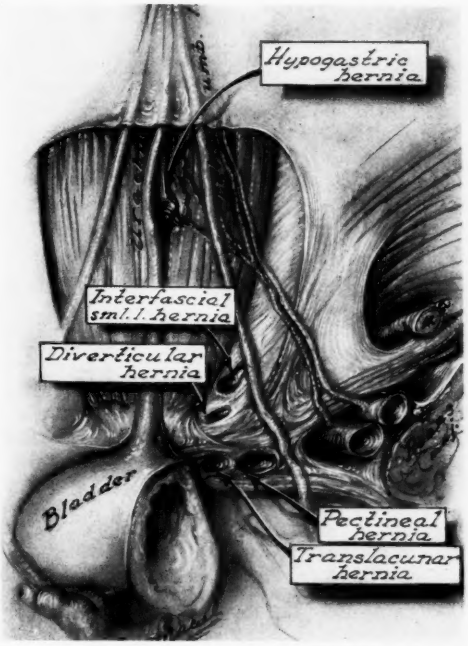

Fig. 8. Hernias in relation to the inguinal fossae. Medial, internal, or supravesical inguinal fossa. External hernias. The external hernias of the supravesical fossa practically always emerge through the lateral vesical triangle or space and may be exclusively external, or they may arise as internal hernias and emerge through this area. For instance, interfascial semilunar line hernia, diverticular hernia, pectineal and translacunar hernias are examples of hernias of the lateral vesical space, or triangle of the supravesical fossa. Also hypogastric hernias are external and they are, of course, in the supravesical fossa.

The external hernias of the supravesical fossa include those which arise in the lateral vesical triangle which is bounded inferiorly by Cooper's ligament, medially by the rectus sheath, and laterally by the hypogastric remnant (Fig. 8). The identification of a lateral vesical hernia is relatively easy. This triangular space is quite varia-

ble, and often lateral vesical hernias are misdiagnosed as direct external hernias through the medial floor of the canal. However, on freeing the protrusion it is found to be extraperitoneal and quite thick, and on more careful dissection, one can see pinkish vesical muscle fibers which present medially rather than extend laterally up the canal as in the ordinary canalicular hernia. Also, if the peritoneum is palpated by inserting a finger through an opening at the abdominal ring, no aperture is found leading into the protrusion. Watschugoff estimated the incidence of all internal supravesical hernias at 0.2 per cent. Consequently, many general surgeons may not have the opportunity of encountering more than 2 or 3 internal hernias of the supravesical fossa during an active practice of 2 decades. Therefore, these hernias may be direct in relationship to the canal, pectineal or translacunar (interligamentous), and interfascial with respect to the inferior component of the semilunar line. Similarly, a perforation of the fascia of the cranial portion of the canal produces a diverticular hernia which is in the triangular area. These are all external lateral vesical hernias of the internal inguinal or supravesical fossa. Another external hernia which may be overlooked is one through a rent in the area of the adminiculum triangularis in the suprapubic region. It therefore behooves every surgeon to be cognizant of the fact that certain semilunar line, canalicular, and interligamentous hernias may be in the supravesical fossa and rightfully classified as supravesical hernias.

CLASSIFICATION OF HERNIAS IN RELATION TO THE PARIETAL STRATA (INTERPARIETAL) (FIG. 9)

Properitoneal
- (a) Inguinoproperitoneal
- (b) Cruroproperitoneal
- (c) Simple properitoneal

Interstitial
- (a) Between transversalis muscle and fascia
- (b) Between transversalis and internal oblique muscles
- (c) Between fibers of the internal oblique muscle
- (d) Between internal and external oblique muscles

Superficial (intrainguinal or inguinosuperficial)
- Pass laterally toward anterior superior iliac spine
- Project upward and mediad toward umbilicus
- Extend inferiorly over inguinal ligament to femoral opening

Ordinarily, one does not think of hernias of the inguinal region in relation to the parietal laminae. Perhaps the dominant reason for this oversight is that the transitional changes in the caudal portion of the abdominal strata are more gradual and less conspicuous. Interparietal hernias of the inguinal region are not as well delineated as those in the ventral region of the abdomen in which cases the parietal layers are clear-cut. Such variants in the position of hernia have been observed with sufficient frequency to make their existence as a class undeniable. Moreover, certain interparietal hernias, particularly the properitoneal type, may be difficult to recognize preoperatively and may be overlooked at operation by the unsuspecting surgeon, with possible fatal outcome. Consequently, despite the rarity of interparietal hernias (although more than 587 have been reported in the literature), it is of utmost importance that they be recognized early and dealt with promptly if we are to prevent an occasional mortality. Certainly, a death from hernia, assuming the patient has no unrelated systemic complication, is preventable and is a reflection on the profession.

It would therefore seem apropos and amply justifiable, to promote not only the canalicular and fossae concepts of hernias, but to include their interparietal relationship as the basis for their third major classification. Accordingly, "properitoneal", "interstitial", and "superficial" have been generally accepted as the simplest and most practical classifications of interparietal hernias.

Many theories have been advanced to explain the production of a bilocular interparietal sac. A better understanding of these theories should be helpful to the surgeon in locating and removing these aberrant sacculations and in applying the appropriate reparative technique for their cure.

Any conditions which prevent the normal descent of the hernial sac or reduction of the hernia are predisposing factors. Specifically, the following factors, singly or jointly, have played an etiologic role in the development of interparietal hernia: (1) narrowing of the abdominal ring, which may prevent reduction of the hernia into the general peritoneal cavity; (2) increased intracanalicular pressure as in taxis or truss-wearing; (3) malformation of the scrotum resulting in an ectopic vaginal process and testis (hydrocele of Nuck's canal has been reported as a cause of interparietal hernia); (4) narrowing of the external ring; (5) taut inguinoscrotal or third inguinal ring; (6) coexisting tautness of the external and inguinoscrotal rings; and (7) congenital peritoneal pouches which may enlarge from increased pressure in the inguinal canal.

Properitoneal hernias are found between the peritoneum and fascia transversalis. By far, the greater number are bilocular, one locule passing through the inguinal or femoral canal and the

other lying between the parietal peritoneum and the fascia transversalis. The locules communicate by a common orifice at the abdominal ring. The bilocular concept was held by Moynihan and Halstead. Whether monolocular, bilocular, or trilocular, properitoneal hernias are classified as inguinoproperitoneal, cruroproperitoneal, and, if arising independently of either the inguinal or femoral canal, as simple properitoneal hernia. These hernias may dissect their way upward and outward; directly backward, resting in the iliac fossa; or downward and inward, sometimes reaching the lateral supravesical area.

The incidence of properitoneal hernia varies widely, from 1 in 5,000 herniotomies (Bull and Coley) to 2 in 500 (Kirchner). Lower and Hicken believe that the frequency of properitoneal hernia is greater than these figures indicate and assume that many cases have been unrecognized. A high percentage of properitoneal hernias are bilocular, but the term bilocular may be misleading and should not be confused with the saddle bag, or pantaloon, hernia which, in reality, is an indirect-direct sac. In the latter, the components are adjacent but have separate communication with the peritoneal cavity, while in the properitoneal hernia, there is a common or single communicating orifice with the peritoneal cavity. Moreover, a properitoneal hernia is prone to occur when there is obstruction to the normal descent of the hernial sac. An ectopic testis should arouse suspicion of a properitoneal hernia, although this hernial variant does occur in the presence of a normal testis in the scrotum and has been demonstrated in women. Moynihan's anatomical studies of fetuses revealed that in 22 per cent of the autopsies he could clearly demonstrate a deep peritoneal pouch near the obliterated hypogastric artery, which easily could have developed into properitoneal hernia. Therefore, it would seem that the pathogenesis of properitoneal hernia cannot be ascribed to a single cause but rather to a combination of factors.

Interstitial hernia, or the second variety of interparietal hernia, was recognized early in the nineteenth century, first by Cooper in 1812, Hesselbach in 1814, and later by MacReady in 1893, and Gobell in 1900. It is to the clinical observations of these surgeons that we owe much of our foundational knowledge of this entity. Because of the paucity of its occurrence, little interest has been manifest in this type of hernia. In fact, one usually thinks of an incisional hernia when the term interstitial is employed, but it is certainly applicable to hernias which dissect between the parietal planes of the inguinal region. Of course, strata of the latter region are not as distinct and conjoin in

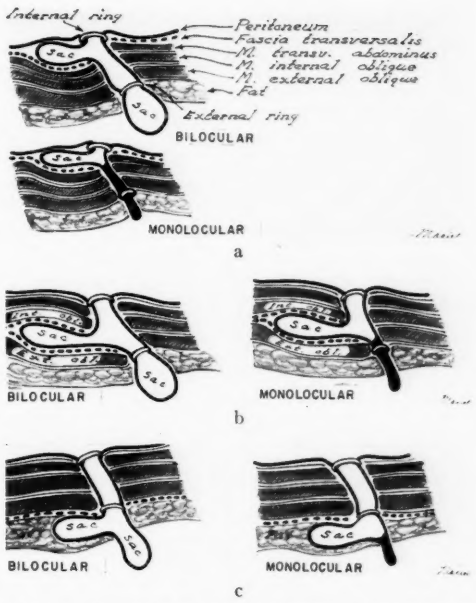

Fig. 9. Hernias in relation to the parietal layers (interparietal). The three types of interparietal hernias are illustrated. *a*, Properitoneal hernias (simple) lie between the peritoneum and fascia transversalis. They are shown as bilocular and monolocular. *b*, Interstitial hernias occur between layers of muscle. When the sac dissects between the parietal layers, it constitutes an interstitial hernia which may be either bilocular or monolocular. *c*, Subcutaneous hernias (superficial inguinal) occur between the aponeurosis of the external oblique muscle and the subcutaneous tissue. They are superficial to the external oblique aponeurosis.

such a way and with such variability that it requires a more intimate anatomical knowledge of this region for a thorough understanding of this saccular aberrancy. The diversified location of the loculus includes the following possibilities: between the transversalis muscle and fascia, between the transversalis and internal oblique muscles, between the fibers of the internal oblique muscle, or between the internal and external oblique muscles. The same divergency of opinion exists as to their locularity as obtains in properitoneal hernias but certainly the majority of the hernias are bilocular. Halstead, Moynihan, and Watson insist that the sac is invariably bilocular, the loculi communicate with each other, and both of them open into the peritoneal cavity through the abdominal inguinal ring. Ehler reported a trilocular interstitial hernia, and in Gobell's series, there were 24 monolocular and 84 bilocular hernias.

As in properitoneal hernia, a significant clinical observation leading to the suspicion of an interstitial hernia is the coexisting ectopic testis, which may be found in 65 per cent of the cases. In a series of 50,000 herniotomies, 42 interstitial hernias were reported by Langton. The diagnosis of an interstitial hernia may be difficult or impossible preoperatively, but there may be certain leads which if present warrant a presumptive diagnosis of interstitial hernia. For instance, acute pain in the groin with obstructive symptoms, an ectopic testis, and a palpable mass above the inguinal ligament are strongly suggestive of an interparietal hernia. However, the absence of these symptoms does not absolutely exclude such a diagnosis. The reduction of the hernia en masse with continuing pain and vomiting, particularly if there should be a high internal ring, may mean that the hernia has been displaced into the interstitial locule and is no longer palpable. The surgeon's complacency may change to consternation when at postmortem examination a strangulated interstitial hernia is found. Occasionally, a globular irreducible mass may be demonstrated lateral to the abdominal inguinal ring, protruding between the fibers of the internal oblique muscle. This rare type of interfascicular hernia is usually attributed to abnormal banding of the muscle.

Superficial interparietal hernia. This variant, which has been referred to as intrainguinal hernia (Boyer) and inguinosuperficial hernia (Kuester), differs from properitoneal and interstitial hernia in that the peritoneal outpouching occurs between the external oblique aponeurosis and the integument. The vaginal process descends through the inguinal canal uneventfully with one loculus continuing into the scrotum and the other spreading out superficially to the external aponeurosis. In most instances the sac meets with an obstruction immediately subjacent to the external ring. With increased intrasaccular pressure, or perhaps because of indiscriminate taxis associated with a taut external ring, a diverticular evagination of the sac occurs. As in properitoneal and interstitial hernias, the sac may be monolocular, but this occurs very rarely. A superficial inguinal hernia may burrow laterally toward the anterior superior spine of the ilium; it may point toward the umbilicus, superiorly and mediad; and, the third alternative, it may extend inferiorly over the inguinal ligament and rest over the femoral canal. The last position of the sac has led to the erroneous term "inguinofemoral hernia."

The sac of a superficial inguinal hernia is congenital in origin. The other causative factors which may play varying roles are the same as those enumerated for properitoneal and interstitial hernia. These hernias usually are thought to be no different from the average hernia until obstruction of an incarcerated loop of bowel occurs. At operation the surgeon, much to his surprise, finds the rare superficial relationship of the sac.

CONCLUSION

A composite classification of hernias of the abdominopectineal trigonum has been presented. It is in contrast to the smaller multiple regional classification which has been followed in most textbooks of surgery. The latter is confusing because of the displaceability of, and the lack of general agreement on, certain boundaries. The classification as proposed is a departure intended to avoid controversial boundaries by envisaging one large all inclusive containment unit. Coincidentally, the new classification is predicated on a three dimensional concept of the relationship of the hernia to the parietes.

By this stereoscopic approach to hernia one is guided into thinking simultaneously of every hernia in relation to the inguinal canal, the semilunar line, the interligamentous space, the inguinal fossae, and, lastly, its relation to the parietal strata. In this way one is better able to visualize the origin, course, destination, and relationship of the hernia to the longitudinal, transverse, and interparietal planes. By more precise anatomic orientation of the hernia, the surgeon is better prepared to make operative repair and ultimately cure the hernia.

The illustrations reveal the evolutionary concept of the composite hernial classification.

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ABSTRACTS OF CURRENT LITERATURE

SURGERY OF THE HEAD AND NECK

HEAD

Primary Tumors of the Frontal Bone. HANS BRUNNER. *Arch. Otolar.*, Chic., 1953, 57: 158.

Tumors arising from the mucosa of the frontal sinus occur less frequently than tumors of the ethmoid and maxillary sinuses. Among other causes, there are two factors which might help to explain the difference. The frontal sinus is absent in approximately 5 to 10 per cent of normal adults, and tumors of the frontal sinus cause nasal symptoms much later than tumors of the ethmoid or the maxillary sinuses.

A case of small hemangioma of the frontal bone, apparently arising from the diploic veins, is reported, and the differential diagnosis between hemangioma and syphilitic and nonspecific periostitis of the frontal bone is discussed. The important x-ray feature that differentiates these lesions is the "sun-ray" pattern seen in hemangiomas of the bone. This is due to radiating spicules of bone overlying the tumor. Periostitis does not show this reaction.

The author also reports a case of osteogenic sarcoma of sclerosing type arising from the periosteum of the frontal squama and causing obliteration of the frontal sinus. Differentiation is made between osteogenic sarcoma, primary carcinoma, and chronic osteomyelitis. X-ray films often reveal prominent differences. In osteogenic sarcoma, there is diffuse sclerosis of the bone due to a combination of both tumor bone and reactive bone. Primary carcinomas show bony destruction with little reactive bone. Diffuse sclerosis, however, does not permit the diagnosis of osteogenic sarcoma since it is often found in fibrous dysplasia, Paget's disease, and chronic osteomyelitis of the frontal bone. Biopsy permits differentiation. JOHN R. LINDSAY, M.D.

Preliminary Report on Improper Selection of Treatment for Basal Cell Epithelioma in the Region of the Orbit and the Nose. GEORGE WARREN PIERCE, E. HORACE KLABUNDE, and HENRY T. BROBST. *Plastic & Reconstr. Surg.*, 1953, 11: 147.

Each and every failure of treatment in the present series of cases of basal cell carcinoma was due to the use of x-ray and/or radium therapy. If irradiation fails to eradicate the lesion, or if there is a recurrence, surgery only should be done. Even 3,000 to 5,000 roentgens of radiation may not destroy a recurrence. Regrowths have occurred in skin which was almost destroyed by irradiation, as well as in skin badly scarred.

Because this tumor almost never metastasizes, adequate excision should eradicate it completely; a margin of one-half centimeter around the tumor seems to be sufficient. Great care must be exercised in evaluating the size of the tumor; and a good magnifying lens is useful. With the lens, an areola-like area is sometimes visible around the tumor. It appears as a smoothening and a slight retraction or dishing-in, suggestive of beginning atrophy of some of the skin elements. Tumor cells are often found in this area; also, tumor nests often lie deep in the corium, making deep, as well as wide, removal necessary.

Punch biopsies or even section biopsies may be inadequate. A negative pathologic report is no positive indication that malignancy does not exist. This complete removal of the lesion is the only safe means of treating a basal cell carcinoma, especially if there has been recurrence after irradiation.

JOHN R. LINDSAY, M.D.

Surgical Procedure in Tumors of the Parotid Gland. DANKO RIESSNER. *Arch. Surg.*, 1952, 65: 831.

The present article constitutes a review of the operative problems in surgery of tumors of the parotid gland, and a report of the author's operative technique. The findings and opinions of other workers with this condition are discussed. The author uses his own procedure for benign tumors and states it is not intended for the obviously malignant infiltrative neoplasm of the parotid gland.

The three important hazards in surgery on the parotid gland are scar, paralysis of the facial nerve, and salivary fistulas.

From the results demonstrated in the anatomical and surgical investigations of the author, and consideration of the literature, the important aspects of surgical anatomy may be summarized as follows:

1. The bilobed structure of the parotid gland is evident in the majority of cases. The relation of the main trunk and branches of the facial nerve to the interlobal plane in most cases is not such as to favor a technique based on this finding.

2. The zygomatic arch, which is not covered by the parotid gland, is the easiest found point of orientation for the beginning of the dissection of the facial nerve.

3. The vegetative secretory enervation of the parotid gland is performed by cutting all the terminal branches of the auriculotemporal nerve. These include (1) those in direct anastomosis with the facial nerve, (2) those entering the parotid gland directly, and (3) those which are spread as nerves of sensation either upon the planum temporale or upon the region of the auditory canal. Cutting these branches does not injure the patient

cosmetically, nor does it injure his general condition.

The operative procedure described is now performed under general anesthesia, the patient being on his back with his head turned in the direction opposite to the tumor.

A cosmetic skin incision is used in the form of an inverted W, immediately before and below the ear lobe. One wing is placed along the zygoma and the other parallel with the inner edge of the cranial end of the sternocleidomastoid muscle. The middle part follows about the lobe of the ear.

The whole of the cartilage funnel as far down as the temporal bone is dissected free. This frees the tumor and the parotid gland from the ear and creates a very wide approach to the operative field. It offers no possibility of damage to the nerve.

The orbicular branch of the facial nerve is next secured, beginning where it obliquely crosses the zygomatic arch and lies on its periosteum.

Having found these structures, the surgeon starts dissection of the orbicular branch in a central direction without taking notice of damage to the gland or tumor. The nerve should not be grasped or pinched, but held on hooks carefully and patiently followed and dissected free.

After completion of the dissection, the nerve will lie exposed in the field like an anatomical specimen and can be followed all the way to the stylomastoid foramen. The auriculotemporal nerve may then be found and severed with all of its branches, as described earlier, after which the tumor is removed by enucleation, partial resection, or morcellement.

The wound is closed with subcutaneous catgut and fine silk. A rubber cigarette roll is inserted for drainage. The latter is removed in 48 hours and the sutures are removed 3 days after operation.

The method has been used in 43 patients. Two patients had temporary paresis of the facial nerve; in one of these the paresis was thought to be due to distention from the tumor. In 1 patient, a 20 day salivary fistula developed. All patients had some weakness in moving the brows and forehead and in closing the eyelids but only for the first few days after operation. One patient died the day after operation, 2 patients died 2 years later. The author believes the method to be adequate for the surgical purposes for which it was devised.

DONALD C. GEIST, M.D.

EYE

The Present Status of Corticotrophin (ACTH), Cortisone, and Hydrocortisone in Ophthalmology. DAN M. GORDON, JOHN M. MCLEAN, and HERBERT KOTEEN. *Brit. J. Ophth.*, 1953, 37: 85.

The authors discuss the present clinical status of corticotrophin (ACTH), cortisone and hydrocortisone in ophthalmology and report their experiences with hydrocortisone.

They point out that the maximum therapeutic value of corticotrophin and cortisone depends upon their early use in curing an acute inflammatory, allergic, or traumatic condition and in preventing chronicity. For this reason, these drugs should not be considered as last minute agents. On the contrary, they should always be employed in the early stages of a disease. The final result depends upon the duration and the severity of the disease process as opposed to the potency, dosage, and length of treatment with the hormone.

Corticotropin and cortisone are two different hormones with two different modes of action. Because cortisone can be employed topically, it is the remedy of choice in the average case of superficial ocular disease. For deeper involvement of the cornea, systemic therapy with either corticotrophin or cortisone is necessary. Corticotrophin as an intravenous drip over a period of 8 or more hours has proved to be the most effective systemic therapy. Use of the new high potency corticotrophins facilitates ambulatory treatment in many patients. Combinations of the local use of cortisone and the systemic use of corticotrophin or cortisone (especially in the oral form) are helpful in chronic cases. Complications rarely occur within the first 2 weeks of systemic treatment.

If an acute inflammatory process does not respond within 48 to 72 hours the dose should be increased or another hormone should be substituted.

If a positive culture is present or some evidence of bacterial infection is present, the supplementary use of antibiotics (those which will function in the presence of a normal or practically normal capillary permeability) is indicated. The authors emphasize the fact that atropine and artificially induced fever, still have a prominent place in treatment.

Hydrocortisone, the newest hormone, requires further research. JOSHUA ZUCKERMAN, M.D.

The Surgical Treatment of Ocular Pemphigus. M. WALLACE FRIEDMAN and EDWIN S. WRIGHT. *Am. J. Ophth.*, 1953, 36: 237.

The authors present a case of pemphigus of the conjunctiva which had obliterated the conjunctival cul-de-sac by a pathologic process. A skin transplant had been performed previously with a secondary irritation of the cornea from the small hairs in the skin. The hairs had been epilated many times but the condition still required further treatment.

The surgery was done to remove the skin completely from the lower cul-de-sac and transplant mucous membrane from the mouth to the lower cul-de-sac. The scar tissue was deeply resected and plastic splints were used immediately after the operation to keep the transplant in place. This also prevented unwanted adhesions. Pressure dressings were applied to the operative site for several days and the result of the surgery was most gratifying.

There was almost a complete range of motion and no recurrence of the symblepharon. There was no chronic conjunctivitis, no entropion, and, for the first time, no need for epilation.

EARL H. MERZ, M.D.

The Isolation of a Virus as the Cause of Behcet's Disease. F. NECDET SEZER. *Am. J. Ophth.*, 1953, 36: 301.

Behcet's disease is a distinct entity presenting three basic and invariable signs: iridocyclitis with hypopyon, aphthae of the mouth, and ulcerations of the genitalia. The ocular lesions are bilateral and begin with lesions of the optic nerve and retina which are followed by iridocyclitis with hypopyon. Severe necrosis of the ciliary body and peripheral choroid is the main pathologic feature. The disease is featured by frequent recurrence, usually at intervals of about a month.

The vitreous of an eye enucleated 9 months after the onset of Behcet's disease was inoculated into the chorioallantoic membranes of fertile chicken eggs. Following cultural passage, intracerebral injection of the material into mice caused a characteristic encephalitis. Injection of the material into the vitreous of rabbits caused ocular lesions similar to those seen clinically.

Complement-fixation tests and neutralization tests indicated that special antibodies against this virus are produced in patients with the disease. The virus caused the death of a large portion of the chick embryos used for cultural passage. A fatal lobar pneumonia followed the injection into guinea pigs. The material remained infective after passage through a Seitz filter with double pads. Electron microscope photographs indicated a diameter of the virus particles of about 100 millimicrons.

FRANK W. NEWELL, M.D.

Meningiomas of the Anterior Clinoid Process as a Cause of Unilateral Loss of Vision. ALFRED UIHLEIN and ROBERT D. WEYAND. *Arch. Ophth.*, Chic., 1953, 49: 261.

This is an excellent presentation on meningiomas of the anterior clinoid process seen at the Mayo Clinic during the period from 1930 to 1950.

These tumors are classified as benign tumors because they do not invade other tissue and because of their pathologic appearance. They are nevertheless very dangerous because of their slow and silent growth as well as their ability to attach to important structures, making complete removal impossible.

Meningiomas constitute 15 per cent of all intracranial tumors and in this series the mortality rate was 32 per cent. A plea is made for early diagnosis and early surgery. To do this, careful study of all unilateral blind cases is necessary.

The symptoms are (1) loss of vision in one or both eyes, (2) puffiness of the eyelid, (3) anosmia, (4) mental changes, (5) diplopia, (6) weakness of arms and legs, (7) photophobia, and (8) headaches.

The findings in this series were (1) complete loss of vision in one eye, (2) unilateral exophthalmos, (3) unequal pupils, (4) paresis of ocular muscles, (5) papilledema—unilateral or bilateral, (6) optic atrophy, (7) visual field changes, (8) x-ray changes, (9) electroencephalographic changes, (10) ventriculographic studies abnormal, and (11) lumbar puncture findings abnormal.

Treatment consists of removal of the meningiomas by a neurological surgeon.

EARL H. MERZ, M.D.

Roentgen-Ray Cataract. Effects of Shielding of the Lens and Ciliary Body. A. J. ALTER and P. J. LEINFELDER. *Arch. Ophth.*, Chic., 1953, 49: 257.

Animal experimentation showing the effects of roentgen irradiation on the lens of the eye was used to help solve the problem as to whether the rays injured the lens fibers directly or injured the vascular supply of the ciliary body, with secondary lens changes from poor nutrition.

Rabbits' eyes were shielded by 2 mm. lead shields so that (1) the entire lens, (2) the central portion of the lens, (3) the periphery of the lens, (4) quadrant of the lens, and (5) the ciliary region was exposed. Then 1,000 roentgens were given to the eyes.

The conclusions were as follows: (1) exposure to roentgen rays does not cause cataracts when the lens is protected by a shield; (2) exposure of the ciliary body alone causes no cataract; (3) exposure of the pupillary portion of the lens is least sensitive to irradiation; (4) exposure of the actively growing equatorid portion of the lens is most sensitive and easily injured by roentgen rays; and (5) exposure of only one quadrant produces opacities in that quadrant only. No general or diffused effect was noted.

EARL H. MERZ, M.D.

Central Areolar Choroidal Sclerosis. ARNOLD SORSBY and R. P. CRICK. *Brit. J. Ophth.*, 1953, 37: 129.

This is a study of the condition called central areolar choroidal sclerosis and of its genetic nature. Four families were followed up, and the clinical features, course, and pathology of the disease were discussed.

1. Mode of inheritance. The affection was observed in only one generation in four of the families and over two generations in one family. Consanguinity was noted in only one family. No mode of inheritance was established.

2. Clinical features. Age of onset appeared to be in early adult life although the symptoms did not occur until the age of 50 or later. The earliest changes seemed to be a central choroiditis with a mottling or an edematous, exudative reaction. This progressed to a vascular occlusion of the choroidal vessels with loss of vision to 20/200 or less.

3. Clinically, the lesion seems to be the occlusion of the choroidal vessels in the central area. The full pathological report is given.

EARL H. MERZ, M.D.

Central Areolar Choroidal Sclerosis. A Histopathological Study. NORMAN ASHTON. *Brit. J. Ophth.*, 1953, 37: 140.

This is the pathological report of a case of central areolar choroidal sclerosis in which the patient died of a coronary occlusion and came to autopsy.

The eyes were enucleated, and the branches of the ophthalmic arteries were dissected out and studied microscopically. Then the right eye was injected with neoprene by way of the ophthalmic artery. The globe was then opened and the choroidal vessels were examined. The left eye was fixed in 10 per cent formol saline and serial sections were made and stained by various methods.

The vessels showed patchy atheroma of the ophthalmic artery, but the branches, including the posterior ciliary arteries, were relatively normal. No narrowing or occlusion was found. A well demarcated avascular area extending from the macular region to the disc was present in the posterior choroid. This was found to be atrophic and fibrosed. No arteriosclerotic changes were found. The outer layers of the retina and part of the pigment epithelium had disappeared without glial formation. Bruch's membrane was not involved.

The conclusion was that the condition was due to a vascular atrophy. EARL H. MERZ, M.D.

Chorioretinitis of Congenital Syphilis. JOSEPH V. KLAUDER and GEORGE P. MEYER. *Arch. Ophth., Chic.*, 1953, 49: 139.

The authors report the incidence of chorioretinitis in children with congenital syphilis and especially with interstitial keratitis. They compare their findings with those of Sidler-Huguenin and point out the frequent occurrence and the diagnostic significance of perivasculitis in the eyegrounds of patients with congenital syphilis. They also present the differential diagnosis between the retinitis pigmentosa type of syphilitic chorioretinitis and primary pigmentary degeneration of the retina.

In congenital syphilis it is the choroid and cornea which are most susceptible to syphilitic involvement; in acquired syphilis the iris is most susceptible, the choroid is less so, and the cornea is rarely affected.

Sidler-Huguenin's classification into four types is based on the eyeground changes in 125 patients with congenital syphilis. Type 1 is the "salt and pepper" fundus. Type 2 presents round or oval pigmented lesions, occurring singly or in groups. (Type 2 is usually bilateral but, in contrast to Type 1, it may occur unilaterally.) Type 3 occurs as small yellowish red areas, which first appear in the periphery. The lesions may remain small or coalesce to assume various shapes. Type 4 is the type which resembles primary pigmentary degeneration of the retina.

Klauder and Myer examined 223 patients who had interstitial keratitis and 71 patients with congenital syphilis who had not had interstitial keratitis. The 71 patients were divided into two groups: group 1 comprised 54 children without ocular complaint who were examined in syphilitic clinics of various hospitals; group 2 comprised 17 patients, mostly adults, who had visual complaints and were patients in the clinics at Wills Eye Hospital. Of the 223 patients with interstitial keratitis, 30 (13.4%) had chorioretinal changes and 18 (8%) had perivasculitis. In some patients, perivasculitis was observed as the only lesion in the fundus. Of the 54 patients with noninterstitial keratitis, comprising group 1, 4 had chorioretinitis and 3 had perivasculitis. Of the 17 patients comprising group 2, 8 had chorioretinitis and 5 had perivasculitis. In the total of 42 patients with chorioretinitis, the authors found it difficult to classify the disease into the four types of Sidler-Huguenin.

Retinitis pigmentosa was not observed in the 223 patients with interstitial keratitis or in the 54 patients with noninterstitial keratitis in group 1. It was observed in only 3 patients in group 2. Retinitis pigmentosa of congenital syphilis is therefore considered rare.

Among the 42 patients with chorioretinitis involvement of the macula central choroiditis occurred bilaterally in 3.

Perivasculitis was a distinctive observation either with or without other fundal lesions manifested as a pale streak bordering the vessels. Either the arteries or veins or both structures were affected, usually in a localized rather than in a generalized manner. The peripapillary or the posterior polar region was affected more often than the periphery.

It is concluded that the presence of perivasculitis in a young child or in an adult (in the absence of other explanation) constitutes reliable evidence of congenital syphilis.

The following features are considered as diagnostic of chorioretinitis of congenital syphilis: (1) the "salt and pepper" fundus, (2) the peripheral localization of the disease or its predominance in that region, (3) its association with perivasculitis, (4) the presence of old interstitial keratitis, and (5) clinical evidence or history suggestive of congenital syphilis.

Serologic tests for syphilis are not decisive.

Sidler-Huguenin's classification is not considered to be of great practical value because the types are too arbitrary, existing in print and as illustrations rather than in clinical reality.

JOSHUA ZUCKERMAN, M.D

Central Retinal Artery Occlusion in Orbital Inflammation. ARTHUR H. KEENEY, KELVIN A. KASPER, and JAMES S. SHIPMAN. *Am. J. Ophth.*, 1953, 36: 346.

A case of fulminating orbital inflammation secondary to sinus infection in a 56 year old woman is presented. In the differential diagnosis the following conditions must be considered: collateral edema secondary to adjacent sinus infection, serous tenonitis, malignant anthrax edema without pustule, cavernous sinus thrombosis, and frontal lobe abscess. Occlusion of the central retinal artery occurred 3 days following admission to the hospital. Prior to this the intraocular pressure was found to be 89 mm., and violent arterial pulsation was present with complete blanching of the nerve head during cardiac diastole. The occlusion apparently arose because the intraocular pressure exceeded the systolic pressure within the retinal artery.

FRANK W. NEWELL, M.D.

Retinoblastoma (Retinoblastoma). FELICIANO PALOMINO DENA. *Gac. méd. México*, 1952, 82: 219.

The author analyzes 57 cases of retinoblastoma. Heredity was not found to be a contributing factor. The intraocular growing type of retinoblastoma was observed in 24 per cent of the cases, intraocular hypertension or glaucoma was found in 14 per cent, extraocular extension in 40 per cent, and distant metastasis in 20 per cent.

While for the first type of tumor no mortality was found, for those with extraocular extension the mortality was 86 per cent, and for those with metastasis it was 100 per cent. This emphasizes the importance of early diagnosis of this type of tumor.

The best results in treatment were obtained from the combination of surgery and x-ray therapy. Healing can be assured when the tumor is found during the first intraocular phase; when it is found in the hypertensive phase healing may be obtained in fully 80 per cent of the cases.

WILLIAM E. RICKETTS, M.D.

EAR

External Otitis. HENRY BRANCA. *Arch. Otolar.*, Chic., 1953, 57: 310.

The author discusses the frequency of external otitis, its climatic and geographic aspects, as well as the general clinical picture found in various forms of the disease. He reviews some of the literature regarding the disease and cites protocols from 15 cases to exemplify the variability of the disease. Besides pointing out the importance of continued interest and study of the condition, his own concepts consist in differentiating the disease into a primarily bacterial one, which is most frequently a pseudomonas infection and which, in its acute form, is readily cleared up with the administration of appropriate antibiotics.

The second classification consists primarily of a fungus type of disease which is very difficult to prove or to diagnose objectively, which responds very poorly to fungicidal drugs, and frequently responds better to x-ray therapy. This type of otitis is really a mycotic dermatosis and is very prone to relapse. It is frequently complicated by secondary bacterial invaders. The author postulates that the recurrent or chronic disease may be primarily an eczema which is clinically obscured by secondary invaders, and which may become less treatable as a result of neurogenic atrophy of the ceruminous glands, the cerumen itself having been shown to be bactericidal and fungicidal.

The author makes a plea for adaptation of therapy to suit the individual case, rather than for a therapeutic method applicable to all cases of external otitis.

WILLIAM K. WRIGHT, M.D.

Modified Radical Mastoidectomy. ARTHUR L. JUERS. *Arch. Otolar.*, Chic., 1953, 57: 245.

The author describes cholesteatoma as a mass of epithelial cells desquamated into the center of a squamous epithelial line cavity. The mass is laminated, and fatty degeneration and cholesterol formation has taken place. Since all cholesteatomas are similar pathologically, the author believes that the classification previously used is confusing, and he classifies cholesteatomas according to their derivation and etiology.

1. Congenital (from embryonal epithelial cell rests).

2. Central perforation with cholesteatoma (occurring only rarely).

3. Marginal perforation with cholesteatoma: (a) secondary to *acute necrotic otitis media* by an ingrowth of squamous epithelium into the middle ear, following denuding of the normal middle ear linings; (b) secondary to *attic retraction* from prolonged obstruction of the eustachian tube.

Once a cholesteatoma is formed, it expands in the direction of least resistance and complications may result from erosions into vital structures. The therapy of cholesteatoma consists in exteriorizing the cholesteatoma sac to such an extent that a small bottle neck no longer prevents egress of exfoliated epithelium.

In the type of cholesteatoma which is secondary to acute necrotic otitis media there is usually middle ear disease, and a complete radical mastoidectomy may be necessary. In the type that is secondary to attic retraction, a modified radical mastoidectomy is sufficient, and often in early cases the hearing can be preserved. If changes have taken place in the ossicles, the hearing can frequently be increased to approximately the 20 decibels level by removing one of the fixed ossicles (usually the incus and the head of the malleus); however, if the stapes is fixed, or later becomes fixed, this hearing increase is not maintained. In the advanced type of attic retraction cholesteatoma, the middle ear is frequently already invaded and a complete radical mastoidectomy is necessary.

The author believes that the interior portion of the matrix of the cholesteatoma can be saved to help epithelize the cavity and close off the middle ear. It should first be meticulously inspected under magnification for small evaginations which might later produce secondary cysts. If the surgeon prefers to remove the cholesteatoma matrix, the middle ear should always be closed off with a skin graft or a tympanomeatal flap. However, these procedures carry with them the increased chance of interfering with the motility of the ossicular chain or developing an attic fistula. The author cites several case reports to emphasize the various points which he wishes to bring out.

This is an exceptionally well organized paper which presents a concept of cholesteatoma formation and its therapy. While generally accepted among otologists, this method of treatment has not been presented in the literature frequently enough to acquaint the general ear, nose, and throat practitioner with its advantages.

WILLIAM K. WRIGHT, M.D.

NOSE AND SINUSES

Congenital Neoplasms of the Nose. W. Brandon Macomber and Mark Kai-Hsi Wang. *Plastic & Recontr. Surg.*, 1953, 11: 215.

Congenital neoplasms of the nose may be classified in three groups according to the origin of the developmental error. They are neurogenic, ectodermic, and mesodermic.

Embryologically, the external nose is cartilaginous at birth. Anterior and adjacent to the cartilaginous capsule, the nasal and frontal bones are developed by intramembranous ossification. There is a gap between the frontal and nasal bones which is filled by a firm membrane, the fonticulus nasofrontalis. Between the frontal and nasal bones in front and the cartilaginous capsule behind, there is the prenasal space. Within this space, a teatlike projection of the dura is present. During growth, the nasofrontal fontanel is replaced by the nasal process of the frontal bone, separating the skin from the dura. The nubbin of dura is encircled by a bony canal, the opening of which is called the foramen cecum. The dural process is normally sealed and obliterates the foramen.

Any failure in complete obliteration of the foramen leaves a pathway along which glial tissue may extend, hence the development of gliomas and encephaloceles. An encephalocele is an actual herniation of the brain into this potential pathway while a glioma is derived from an encephalocele which has been cut off from its origin.

Before replacement of the nasofrontal fontanel by the nasal process of the frontal bone, the dura and the skin are in contact without intervention of any bony structure. If any part of the ectoderm fails to separate from the dura and is carried to the prenasal space, a dermoid cyst will be formed, usually behind the nasal or frontal bone.

Hemangiomas, either capillary or cavernous, are congenital in origin, arising through embryonic sequestration of mesodermal tissue.

A glioma may be extranasal or intranasal. The male is more often affected.

The extranasal tumors are usually at the side of the bridge of the nose. The root of the nose is often broadened and the eyes are more widely separated. The tumor presents itself as a dome-shaped, reddish, moderately firm, movable mass. There is no pulsation. Usually, there is no defect in the skull.

The intranasal glioma is less common. It is situated high in the nasal fossa and is often mistaken for a polyp.

Gliomas are best treated by surgical excision. In the intranasal type, careful examination is important to differentiate the glioma from the encephalocele.

Encephaloceles are distinguished from nasal gliomas only with difficulty. Structurally, they are quite different: the encephalocele contains an ependymal lined surface filled with cerebrospinal fluid while the glioma is a solid mass of glial tissue. Clinically, one must look for a defect at the base of the skull, pulsation of the tumor, and increase in its size on straining. The treatment of choice is excision and closure of the dural defect. Failure to recognize this condition in the intranasal type often leads to meningitis after excision.

Dermoid cysts of the nose occur along the midline of that organ. Most frequently they are subcutaneous, but occasionally they extend beyond the nasal bones. A sinus may be present with dimpling. This sinus may extend to variable distances and depths.

Complete surgical excision of the entire lesion is the only method which ensures a cure. Those previously operated on, or in which there is old or active infection, are much more difficult to remove than uncomplicated ones.

Nasal hemangiomas of the capillary type, or mixed types may be readily identified by their strawberry-red skin surface. Pure cavernous hemangiomas are distinguished by their faint blue tinge, softer texture, diffuse outline, and collapsibility.

Injection with 5 per cent sodium morrhuate is the treatment of choice when the diagnosis has been clearly established. Surgery is always withheld in those cases which do not respond to sclerosing therapy.

Several interesting case reports are presented.

John R. Lindsay, M.D.

Early Diagnosis and Treatment of Carcinoma of the Nose. E. D. D. Davis. *Brit. M.J.*, 1953, 1: 582.

The author reviews the pathologic anatomy of carcinoma of the nose. The material is divided into extranasal lesions involving the nasal cavity secondarily, and intranasal lesions from the ethmoid and middle meatus.

The extranasal growths are divided into an upper group which arises in the anterior fossa of the skull, sphenoid and nasopharynx, and a lower group which arises in the maxillary alveolus, cheek sulcus, and palate. The author has perused the notes of 60 cases of ethmoidal carcinoma. The first symptoms were usually pain in the cheek and around the eye, blood-stained foul discharge, occasionally nose bleeding, lacrimation, and edema of the middle meatus. Routinely he takes stereoscopic roentgenograms.

If there is any question about the diagnosis, an exploratory operation should be done, accompanied by preparation for complete excision, should a frozen section be positive. A negative biopsy should be repeated if there is a suspicion of malignancy.

Common histological types of nasal carcinomas are squamous cell. adenocarcinomas and undifferentiated carcinomas. The author believes that the results of radium and deep x-ray therapy have been uniformly disappointing, and that radical electrosurgery, followed by x-ray therapy with free access to the growth, is the treatment of choice. The general principles of surgery consist of thorough exposure of the neoplasm, to find its limits, and com-

plete excision of the tumor by diathermy, with a margin of the normal tissue where possible. Even when the hard palate and the floor of the nose are not infiltrated by the tumor, they are removed to form a window so that the area of the growth can be inspected and open to treatment with diathermy and radiotherapy after the skin incision has been closed.

General statistics indicate a 5 year survival rate of 18 to 20 per cent with the therapy described.

WILLIAM K. WRIGHT, M.D.

Clinical Aspects of Tumors of the Maxillary Sinus. CLYDE A. HEATLY. *Arch. Otolar.*, Chic., 1953, 57: 152.

Less than 2 per cent of all malignant tumors of the upper respiratory and alimentary tracts involve the maxillary sinus. Many of the benign tumors are observed even more rarely.

The embryologic development of the upper teeth and maxilla introduces both ectodermic and mesodermic elements in complex formations. Benign tumors include osteoma, osteochondroma, myxoma, and the dental derivatives—adamantinoma and odontoma. The maxillary sinus is occasionally the site of predilection for the extramedullary forms of plasma cell tumors. Mixed salivary gland tumors have been found. The malignant tumors of the antrum are usually squamous cell carcinomas, although adenocarcinomas and transitional cell carcinomas are occasionally encountered. Primary sarcoma is rare.

Certain tumors are considered locally malignant; that is, if they are incompletely removed there is a marked tendency to recurrence and local destruction. In this group are adamantinoma, chondroma, plasmocytoma, and cylindroma.

Malignant tumors are generally considered to metastasize relatively late. The principal extension is posteriorly, by way of the choanal network, to the retropharyngeal and deep jugular nodes. Metastases occur more frequently than is generally believed. In several large series of patients, metastases were found in 29 to 61 per cent.

After the diagnosis has been made by biopsy, these tumors are treated by surgery, irradiation, or a combination of both. The majority of the benign tumors can be removed successfully by surgery. The importance of creating a permanent infralabial opening in cases of benign tumors with recurrent tendencies must be strongly emphasized. The treatment of malignant neoplasms must be individualized. Also, if a combination of surgery and irradiation is employed, the decision as to which of these is to be used first is an individual one.

In the event that surgery cannot be curative, it can accomplish several desirable purposes: it removes the bulk of the tumor, permits more adequate appraisal of the boundaries of the lesion, makes possible the use of intercavitary radium, and guarantees adequate drainage for the infection and sequestration.

JOHN R. LINDSAY, M.D.

PHARYNX

Hypopharyngeal Carcinoma in Sideropenic Dysphagia. NILS LINDVALL. *Acta radiol.*, Stockh., 1953, 39: 17.

The author reviews the literature on sideropenic dysphagia which is also known as the Plummer-Vinson syndrome. It may be hereditary or dietary (particularly iron or vitamins) in nature. There is frequently a hypochromic or, occasionally, a pernicious type of anemia, but the important findings consist of epithelial changes (rhagades at the corners of the mouth, atrophy in the buccal and pharyngeal mucous membranes, dysphagia, finger nail changes, and fissuring of the finger tips). The disease occurs primarily in women.

The treatment of this syndrome has consisted mainly of iron administration. More recently, in 1946, degenerative changes were described in the hypopharyngeal and esophageal mucosa, which consisted of vesiculation of the cytoplasm and degeneration and pyknosis of the nuclei with increased numbers of mitoses. Roentgen changes consist primarily of a foldlike structure projecting inward, usually from the anterior wall. Occasionally circular constrictions have been noted, or an elongated constriction of the upper part of the esophagus.

Accumulated evidence shows that in some of the patients with this type of dysphagia, carcinoma of the hypopharynx or of the upper part of the esophagus has developed. Authors are not in complete agreement as to its incidence, but it is apparently of sufficient frequency that careful follow-up examinations of all patients with this condition, both roentgenologically and, if necessary, by esophagoscopy, are imperative. The author cites 8 illustrative cases. Usually the carcinoma is situated proximal to the constriction.

WILLIAM K. WRIGHT, M.D.

NECK

Surgical Management of Papillary Carcinoma of the Thyroid Gland. The Case for Total Thyroidectomy. IAN MACDONALD and PAUL KOTIN. *Ann. Surg.*, 1953, 137: 156.

There is now nearly unanimous acceptance of lateral cervical deposits of a thyroid neoplasm as invariable metastatic indications of primary carcinoma of the thyroid gland which not infrequently is clinically occult. The authors believe that the thyroid gland should be regarded as a single organ site in respect to the surgical management of its neoplasms. If a focus of metastatic thyroid carcinoma is present in a lymph node, the entire thyroid should be removed, for approximately once in 7 instances the primary lesion will be in the contralateral thyroid lobe. When the clinically evident involvement is limited to a single focus in one lobe and there is no cervical lymphadenopathy, homolateral block dissection of the neck seems unnecessarily drastic in a neoplasm which usually pursues so dilatory a natural course. With this particular clin-

ical setting, a much more useful procedure is total thyroidectomy combined with a limited regional dissection in the area of the thyroid, with the internal jugular veins as the lateral limits of the operative field. This procedure is far preferable to a lobectomy and homolateral "prophylactic" dissection, for the pathologist may demonstrate either multiple foci of disease within the thyroid, or unsuspected contralateral metastases in the lymph nodes adjacent to the opposite lobe. This most curable form of thyroid carcinoma deserves the same type of local extirpative procedures employed for curable cancer in other primary anatomical sites.

The authors' experience indicates that the following outline represents a more reasonable approach to the management of goiter in which cancer may be found:

1. A thyroid tumor with no clinical evidence of lymphadenopathy. In such a situation, excision of the tumor with a reasonable margin of adjacent thyroid tissue is done and, if one has the privilege of working with a pathologist who is highly competent in rapid frozen section technique, he can usually make an immediate diagnosis, as is done in tumors of the breast. Lacking a rapid frozen section or if the frozen section is equivocal, further action is deferred pending diagnosis by paraffin sections which should be available in 24 to 48 hours. If the lesion is carcinoma, an extracapsular total thyroidectomy is done with a regional dissection in the thyroid area, from one internal jugular vein to the opposite vein. The specimen should be searched for parathyroid bodies which, if found, are implanted in muscle tissue.

2. Lateral node metastases, with or without an apparent primary lesion in the thyroid gland. One of the involved nodes is examined, either by needle biopsy or surgical exposure, and rapid frozen section or formal biopsy is done. If metastatic papillary carcinoma of thyroid origin is demonstrated and if there is unilateral cervical node involvement, radical block dissection of the neck is done on the involved side with resection of the sternocleidomastoid muscle and internal jugular vein, the dissection including the entire anterolateral triangle of the neck with the exception of the submaxillary area, and including also the adjacent portion of the posterior cervical triangle, particularly in its lower third. The operation is completed by a total extracapsular thyroidectomy and dissection of the adjacent nodes on the contralateral side as far as the opposite carotid sheath.

EARL O. LATIMER, M.D.

Experience Gained from 7,000 Thyroidectomies (Erfahrungen an 7,000 Schilddruesenoperationen). M. RICHARD. *Helvet. chir. acta*, 1953, 20: 16.

Within a period of 22 years the author performed 7,000 thyroidectomies, and from these experiences he has drawn the following conclusions.

Thyroxin demands of the body regulate the absorption of iodine by the thyroid gland, its transformation into thyroxin, deposits of the latter in the follicular colloid, the liberation of thyroxin by proteolytic enzymatic reaction, and its entrance into the circulation. The whole process depends on the supply of raw materials, of which iodine and vitamin A play the most important role. Both products in conjunction with the thyrotropic hormone have a biocatalytic effect.

Morphologic disturbances manifest themselves in the form of various types of goiter. The character of the functional disturbances is influenced by the causative factor. Iodine deficiency produces a goiter with a tendency to hypothyroidism, while a primary vitamin A deficiency impairs the hormonal storage in the colloid, produces iodine deficiency in the thyroid gland, and floods the body with thyroxin. Goiter is a metabolic disease, not only of the thyroid gland but of the entire organism, and it should be considered as the morphologic expression of enzymatic disturbances within the gland, produced by an endogenous or exogenous lack of raw materials necessary for synthesis of the hormone. The conclusion is justified that endemic, as well as epidemic, goiter is a disease of nutritional deficiency.

Since the introduction of iodized salt, the incidence of goiter among school children in Switzerland has been reduced to from 10 to 15 per cent of its frequency before the employment of this prophylactic measure.

Parenchymatous adenomatous goiter was present in 54.4 per cent of the patients in the author's series, colloid adenomatous goiter was present in 14.0 per cent, toxic diffuse goiter in 1.2 per cent, malignant goiter in 1.0 per cent, and Riedel's goiter in 1.5 per cent, while other types of diffuse or adenomatous goiter constituted the rest of the material.

The preoperative preparation of patients with toxic goiter consists of the administration of Lugol's solution, thiouracil, and vitamin A. The operation is performed either under sodium pentothal intravenous anesthesia or under local anesthesia combined with avertin. Intubation is not employed routinely and is especially avoided in recurrent goiter. The superior and inferior thyroid arteries are ligated but not severed, in order to avoid air embolism, tetany, or secondary hemorrhage. The mortality in the entire series was 0.3 per cent.

JOSEPH K. NARAT, M.D.

Carotid Body Tumors (Chemodectomas). JOHN R. PETTET, LEWIS B. WOOLNER, and EDWARD S. JUDD, JR. *Ann. Surg.*, 1953, 137: 465.

Chemodectoma is the name suggested by Mulligan for a neoplasm that consists of chemoreceptor cells such as occur in the carotid and aortic bodies, the glomus jugulare, and possibly along other portions of the peripheral circulatory system.

The authors are concerned primarily with such tumors that arise in the carotid body, as these are the ones most frequently encountered and of greatest interest to the general surgeon. Although these tumors are rare entities, many articles concerning them have appeared in the literature; however, no unanimity of opinion exists in regard to many fea-

tures that are of importance from the viewpoint of the pathologist, the surgeon, and the patient.

The study comprises a review of the 314 cases of chemodectoma of the carotid bodies reported in the literature, and of 47 cases in which patients were treated at the Mayo Clinic. In 2 of these latter cases, the tumors were bilateral (a total of 49 tumors in 47 patients). Nineteen of these cases have been reported previously.

Chemodectomas are nonmetastasizing, nonfunctioning tumors of the chemoreceptor tissue that is found in the carotid bodies, glomus jugulare, ganglion nodosum, and the aortic and pulmonary bodies, and perhaps in other locations along the peripheral circulatory system. The largest collection of this tissue is found in the carotid bodies and this is the location of the majority of tumors.

Chemodectomas of the carotid body do not metastasize despite their occasional bizarre appearance on microscopic examination. They produce symptoms by pressure on surrounding structures, but in the great majority of cases these symptoms are of little significance and the patient seeks treatment primarily because of the cosmetic defect produced by the tumor. Clinical diagnosis of these tumors is grossly inaccurate and surgical exploration is necessary to confirm the diagnosis and to determine operability.

In many instances the tumor so intimately surrounds the carotid bifurcation that it cannot be removed without injury to the carotid arteries. Because of the high mortality and morbidity rates associated with ligation of the carotid arteries, and the slow-growing, benign nature of these tumors, no attempt should be made to remove the tumor if this necessitates ligation of the common or internal carotid artery.

This study is in agreement with other studies reported in the literature in so far as the clinical findings and results of treatment are concerned, but the authors do not agree with the generally held opinion that these tumors are in some instances malignant. None of the cases reviewed in the complete paper presented any evidence of metastasis and no unequivocal evidence of malignancy could be found in the cases reported in the literature.

Reconstruction of the Cervical Esophagus. WILLIAM L. WATSON and JOHN M. CONVERSE. *Plastic & Reconstr. Surg.*, 1953, 11: 183.

Among 115 cases of cancer of the cervical esophagus, there were 19 cases suitable for discussion. Back in 1939 the cervical esophagus was first exteriorized and later amputated; then a tube of skin was used to replace the esophagus. This first patient is in good health today.

The second stage in the management of this type of case consists of the use of two lateral rectangular flaps of skin to replace the resected esophagus. Thirteen patients were operated upon and 8 have survived. An alternative procedure for the formation of a cervical esophagus in this group consists of migrating a tubed pedicle graft from a hairless portion of the anterior chest wall, in steps. Three patients were treated in this manner, and one is dead of the disease.

The third stage in the treatment of this condition has been evolved: a unilateral radical neck dissection with complete thyroidectomy and removal of the larynx and esophagus was carried out. In some instances the first portion of the sternum was removed. Postoperative complications have been numerous.

Three full case reports are discussed in detail with many figures to clarify the text. In all of the cases, living tissue reconstruction of the gullet has been carried out.

This series demonstrates the fact that cancer of the cervical esophagus is curable by surgical measures. RICHARD J. BENNETT, M.D.

SURGERY OF THE NERVOUS SYSTEM

BRAIN AND ITS COVERINGS; CRANIAL NERVES

Spontaneous Subarachnoid Hemorrhage: A Surgical Challenge. H. R. I. WOLFE. *Brit. J. Surg.*, 1953, 40: 319.

The author reviewed 93 cases of spontaneous subarachnoid hemorrhage admitted to the Cardiff Royal Infirmary during the period between 1936 and 1947. Of this group there were 52 fatalities and 41 survivors. The causes of the hemorrhage were listed as: rupture of berry aneurysm (45), rupture of large aneurysm (2), rupture of mycotic aneurysm (2), angioma (1), hemorrhage into astrocytoma (1), benign hypertension (4), and etiology unknown (7).

In this group there were 52 aneurysms in 47 patients, 5 patients having two lesions. The position of these aneurysms of the circle of Willis were listed as follows: anterior cerebral artery (5), anterior communicating artery (10), internal carotid artery at bifurcation (8), middle cerebral artery at origin (3), middle cerebral artery at "leash" (14), posterior communicating artery—anterior end (6), posterior cerebral artery at origin (3), basilar artery at bifurcation (3).

The clinical analysis of these cases did not reveal any particularly new facts. There was little to explain the cause for the bleeding occurring at the particular time that it actually transpired; the symptoms usually consisted of the sudden onset of headache and neck pain, followed by loss of consciousness in a patient who showed signs of meningeal irritation and bloody spinal fluid. Localizing neurological signs were not often present and were not dependable when discovered. The author stressed that a high percentage of these patients had multiple bleeding episodes, some occurring very close together, and one as long as 23 years prior to the second and fatal hemorrhage.

The pathologic locations of the actual hemorrhages were listed as follows: subarachnoid (25), cerebral rupture, intraventricular hemorrhage, and subarachnoid leak through foramina of fourth ventricle (9), cerebral and subarachnoid rupture with intraventricular hemorrhage (7), cerebral and subarachnoid rupture (5), cerebral rupture (1).

Fatal subarachnoid bleeding from rupture of an aneurysm occurred most commonly in the 40 to 60 year age group, while the fatal episodes which occurred as a result of hypertension were most common in the 50 to 70 year age group. The author also makes an interesting theoretical observation in attempting to explain the higher mortality rate among patients having second and third bleeding episodes. He believes that the healing process from the primary episode bound the aneurysm to the brain and obliterated the nearby subarachnoid space so that subsequent bleeding produced more brain damage.

As far as treatment is concerned, the author believes that arteriography should be carried out as soon as possible after the diagnosis has been established. Following the demonstration of the aneurysm the author recommended that ligation and division of the common carotid artery should be:

1. Carried out immediately: (a) upon a patient, who, having recovered from the first hemorrhage, exhibits signs and symptoms of a second hemorrhage; (b) upon a patient who remains for a prolonged period in a fluctuating state of unconsciousness.

2. Given early consideration if the patient (a) is over the age of 30; (b) is hypertensive; (c) has remained active during the early stage of the illness; (d) has a past history of previous hemorrhage. It could be determined at the time of operation whether the patient would withstand the ligation, by temporarily occluding the vessel for 15 minutes with a tape ligature tied over a piece of rubber tubing.

JOSEPH RANSOHOFF, M.D.

The Treatment of Intracranial and Cranial Suppuration with Reference to the Local and Systemic Use of Bacitracin. PAUL TENG and FRANK L. MELENEY. *Surgery*, 1953, 33: 321.

This report consists of 7 cases of intracranial suppuration, 3 brain abscesses, 3 cases of septic meningitis, and 1 case of subdural empyema associated with an intracerebral abscess. There were 4 patients with infected craniotomy wounds and all of the above were treated with local intrathecal, intracerebral, or intraventricular administration of bacitracin with or without the intramuscular administration of bacitracin. Ten of the patients survived and 1 died as a result of gastrointestinal and pulmonary complications.

Bacitracin was used as a prophylactic in 3 patients, 2 of them with acute postoperative aseptic meningitis and 1 with a compound fracture of the skull with cerebral fungation. Intrathecal administration was used in the first 2 and intracerebral injection in the latter.

No untoward effects resulted from its use in the nervous system directly. The authors believe that this is the antibiotic of choice for neurological infections, as organisms are usually sensitive and no toxicity resulted from the local application to the central nervous system.

A plea is made for sensitivity study in treating all infections. HOWARD A. BROWN, M.D.

Chronic Subdural Hematoma. Diagnostic Considerations. E. S. GURDJIAN and J. E. WEBSTER. *M. Clin. N. America*, 1953, 37: 437.

The authors review 95 cases of chronic subdural hematoma. The discussion includes a historical sketch of earlier studies referable to this problem and the underlying pathology which is encountered.

The symptomatology and findings in typical cases are reviewed, as well as the bizarre types, which are more difficult to diagnose. The value of pneumoencephalography, electroencephalography, and angiography as diagnostic aids is emphasized.

Angiography gave the most accurate localization with 10 of 11 findings proving correct at the operating table. The authors urge this method of study in suspected cases of subdural hematoma.

Exploratory bur holes may be used in doubtful cases in which contrast media has not resulted in positive information. HOWARD A. BROWN, M.D.

Diagnosis of Tumors of the Pituitary Body. JOHN RAAF and WINCHELL MCK. CRAIG. *West. J. Surg.*, 1953, 61: 93.

Neoplasms in and near the pituitary body vary greatly in their amenability to treatment. Operations directed against some tumors in the region of the optic chiasm are attended by a high incidence of mortality whereas operations for other tumors are relatively safe.

To obtain the best results with the least risk to the patient, the diagnosis must be made early.

Primary tumors of the pituitary body may be divided into adenomas of the anterior lobe and adenocarcinoma. In general, these tumors produce two types of symptoms, namely, endocrine changes and symptoms due to pressure. Symptoms of pressure are usually manifest on structures in the locale of the tumor, but generalized increased intracranial pressure occasionally is present.

Chromophobe adenomas constitute approximately 70 to 80 per cent of the pituitary adenomas. Disturbance of sex function may be the first noticeable disorder. As the condition progresses, the hair becomes fine, dry, and lusterless; the axillary and pubic hair becomes thin, and in the male the beard is lost. The skin grows soft, smooth, and waxy, and sometimes is prematurely wrinkled. Lassitude, hypersomnia, easy fatigability, and a feeling of coldness are common complaints. Many times moderate obesity develops which is frequently of the feminine type; the breasts enlarge, and the abdomen and thighs fill out. The basal metabolic rate may be reduced and the sugar tolerance is elevated. Enlargement of the sella turcica is the usual roentgenographic finding. Calcification occasionally occurs within the sella or in the suprasellar region. Expansion of a chromophobe adenoma results in stretching the dural capsule which finally ruptures and pressure on the optic chiasm follows. On rare occasions a chromophobe adenoma will be diagnosed and operation performed when no visual field defect is present. Ocular imbalances and even protrusion of an eyeball can occur. Headaches are usually not severe unless the tumor is large or blocks the third ventricle and produces hydrocephalus. Except for marked apathy, mental disturbances are not a prominent symptom. Other tumors and inflammatory and vascular lesions in the region of the chiasm must be distinguished from chromophobe adenoma of the pituitary. Ventriculography has limited value in the diagnosis of pituitary tumors and electroencephalography has not been useful in the authors' hands in this type of tumor. Arteriography, particularly when the question of aneurysm arises, is an important diagnostic aid.

Acidophil or eosinophil adenomas are less common than the chromophobe variety. The symptoms of acidophil adenomas result from excessive production of the growth hormone. If the hyperfunction of the eosinophil pituitary cells occurs during childhood, before the epiphyses have closed, gigantism results. After closure of the epiphyses the hyperfunctioning eosinophil adenoma results in a deformity called "acromegaly." Enlargement of the hands and feet, barrel chest, prognathous jaw, prominent supraorbital range, and enlargement of the soft tissue and viscera are among the common symptoms.

The condition now known as "pituitary basophilism" or "Cushing's disease" consists of bizarre complex symptoms of a polyglandular dyscrasia. Usually present is a painful, plethoric adiposity of the face, neck, and trunk. The adiposity does not involve the extremities. There is cyanosis of the face, neck, hands, and feet and a hypertrichosis in the female with a decrease in normal hair. Apathy and muscular weakness, amenorrhea in the female, and loss of potentia in the male are prominent symptoms. The skin becomes dry, mottled, scaly, and pigmented, and often facial acne is present. Polydypsia and polyuria may occur and often there is vascular hypertension.

Sosman stated that the syndrome was a definite clinical entity, and that the diagnosis can be made with a high degree of certainty, particularly with the aid of urinary hormone assay, the uric acid-creatinine ratio, the adrenocorticotropic hormone test, and the adrenalin test.

Adenocarcinoma of the pituitary gland is rare. The cells of the adenocarcinoma are nongranular. The tumors have a tendency to invade surrounding structures but do not often metastasize.

Further data on the diagnosis of tumors of the pituitary body are included in the complete report.

Cerebral Disease Due to Functioning Islet-Cell Tumors. J. E. RICHARDSON and D. S. RUSSELL. *Lancet*, Lond., 1952, 2: 1054.

The authors present 6 cases of this syndrome in patients with strikingly similar symptoms and physical findings. All of the patients were between the ages of 36 and 39. The duration of the illness was quite rapid, being a matter of months from the onset of symptoms to the development of permanent coma. The typical picture was that of a previously well patient who developed repeated attacks of loss of consciousness accompanied by profuse sweating, trembling of the extremities, and, at times, considerable anxiety. In most of the cases a primary disorder of the central nervous system was suspected and investigations were often directed towards a possible brain tumor.

In 4 of the cases the diagnosis was made on the basis of a fasting blood sugar level of 30 to 35 mgm. per cent. Three patients were successfully treated by abdominal exploration and removal of the pancreatic tumor.

In their discussion of the clinical picture, the authors point out that the highly sensitive cells of the central nervous system respond at first to hypoglycemia in a reversible fashion; later, however, the damage is permanent. Pronounced vegetative disorders—sweating, pyrexia, tachycardia, flushing, and possibly clouding of consciousness—pointed to hypothalamic damage, rather than to an excess of adrenalin, as being responsible for some of the clinical manifestations. The structural damage seen in the brains examined at autopsy pointed to the need for early and correct diagnosis if patients are to be salvaged. JOSEPH RANSOHOFF, M.D.

Controlled Hypotension in Neurosurgery, with Special Reference to Hypotension Induced by Pneumatic Suction Applied to the Legs. ANTHONY JAMES, R. L. COULTER, and J. W. SAUNDERS. *Lancet, Lond.*, 1953, 264: 412.

Three hundred cases of neurosurgery comprise this series; 150 cases in which no attempt was made to lower the pressure (normotensive group) are compared with 150 cases in which such an attempt was made (hypotensive group). Hexamethonium bromide (H.M.B.) and posture were used in the first 100 cases, and in the subsequent 50 cases H.M.B. and suction to the legs was used. The negative pressure device was devised (Fig. 1) because the necessary posturing of the patient when H.M.B. was used alone did not at all times coincide with good surgical exposure.

The H.M.B. was injected intravenously, the initial dose varying from 20 to 50 mgm. It was found that the blood pressure of some patients was adequately controlled by one injection of 20 to 30 mgm. Hypertensive patients usually required less than normotensives. An attempt was made to keep the systolic pressure below 65 mm. Hg. When the suction device was used (40 to 50 mm. Hg. pressure), additional injections of H.M.B. were usually unnecessary to maintain the systolic pressure at 60 mm. Hg. or below.

The results and comparison of hypotensive with normotensive patients can best be seen in the accompanying chart (Table I).

Only 2 unusual complications arose among the hypotensive patients during their hospital stay. Only 1 of them (transient symptoms of probable thrombosis of the right inferior cerebellar artery) could have been caused by the operative hypotension. No postoperative intracerebral hematomas occurred. Estimations of cerebral venous oxygen showed no reduction during surgery in the hypotensive group.

Electrocardiography was performed before, during, and after surgery in the hypotensive group without any evidence of myocardial ischemia.

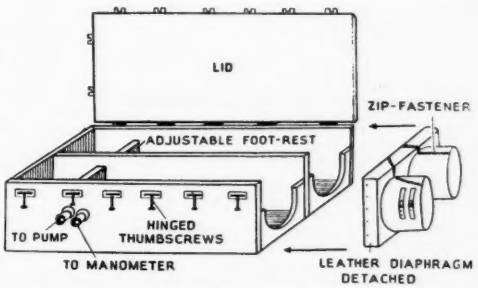


Fig. 1 (James *et al*). The negative-pressure apparatus.

Urine taken before, during, and after hypotension revealed no abnormality, and all of the patients produced significant amounts of urine while their blood pressure was low.

The authors state that intracranial tension decreases with the blood pressure. Thus, when controlled hypotension is used, even in conditions in which the intracranial tension is raised preoperatively, the dura is slack when the bone flap is raised and the brain does not protrude when the dura is opened. This situation is particularly desirable for exploration of the pituitary or hypothalamic region.

TABLE I.—COMPARISON OF RESULTS OBTAINED IN NORMOTENSIVE AND HYPOTENSIVE PATIENTS

	Normotensive patients (no H.M.B.)	Hypotensive patients	
		H.M.B. and posture	H.M.B. and suction
Craniotomies:			
Number	102	39	36
Mean total H.M.B. (mgm.)		104	65
Satisfactory hypotension and hemostasis		54%	75%
Patients requiring transfusion	64%	69%	39%
Pints per patient of whole series	0.95	1.05	0.66
Mean duration of anesthesia (hours)	4¼	4¼	4¼
Mortality	18.6%	15.4%	11.1%
Laminectomies:			
Number	10	55	13
Mean total H.M.B. (mgm.)		75	46
Satisfactory hypotension and hemostasis		60%	92%
Patients requiring transfusion	50%	9%	8%
Pints per patient of whole series	0.5	0.15	0.15
Mean duration of anesthesia (hours)	3¼	3	3
Mortality	20%*	0	0

*The 20 per cent mortality shown for laminectomies in the normotensive patients is misleading. This represents 2 patients only, of whom one had a widespread retroperitoneal sarcoma from which she died some weeks later, and the other died from massive pulmonary embolism.

The control of hemorrhage is also believed to be greatly facilitated by hypotension. Large vascular meningiomas and arteriovenous malformations were removed completely, with little blood loss. In the all too frequent emergency of a bursting cerebral aneurysm during its mobilization preparatory to clipping, the hypotensive technique has proved of value. The suction to the legs can be temporarily increased, dropping the blood pressure to lower limits until the emergency is past.

In laminectomies the most striking feature was the almost complete absence of bleeding from the epidural veins.

The authors emphasize that the blood pressure can be varied at will over a considerable range by regulating the suction pressure on the legs.

DAVID G. FREEMAN, M.D.

SPINAL CORD AND ITS COVERINGS

Syndromes of Cervical Root Compression. Neurologic and Roentgenologic Aspects. EDWARD B. SCHLESINGER and JUAN M. TAVERAS. *M. Clin. N. America*, 1953, 37: 451.

The authors give a very comprehensive review of the problem of cervical root compression. The syndrome resulting from cervical disc derangement constitutes the major portion of the report and includes anatomical and pathological considerations, as well as etiological factors and the clinical symptoms and findings.

Local pain and muscle spasm in the paravertebral and shoulder regions result from early disc changes before rupture and nerve root syndromes appear. Associated headache and dizziness resulting from these early manifestations of disc derangement are discussed.

Localization by motor, sensory, and reflex study is clearly outlined and a very good survey of the diagnostic problems is included. More extensive nerve root and spinal cord compression syndromes receive attention as well as the differential diagnosis of other painful conditions in the cervical areas, such as tumors, bone diseases, and metabolic diseases.

The authors believe that the scalenus anticus syndrome is not often primary, but results from nerve root irritation in the cervical spine frequently as a result of cervical root compression.

Treatment includes conservative measures, such as heat, rest, antispasmodics, and procaine injections, as well as cervical traction and supportive collars.

Intractable cases or those with progressive nerve deficiency are treated surgically through a minimal laminectomy exposure.

The x-ray diagnosis and details of myelography are also thoroughly discussed.

HOWARD A. BROWN, M.D

Ruptured Lumbar Intervertebral Discs. EVERETT G. GRANTHAM and R. GLEN SPURLING. *M. Clin. N. America*, 1953, 37: 479.

This report is based upon 700 verified ruptured lumbar intervertebral discs.

The anatomy and pathological changes occurring in intervertebral discs are described. The clinical symptoms and findings in patients with typical ruptured disc are discussed in some detail, as well as the x-ray findings and myelographic investigations.

A careful history and clinical examination are thought to be diagnostic in a high percentage of cases.

Operation is never undertaken except in an acute phase of the process and no fusion operation is combined with disc removal. It is believed that such orthopedic procedures are seldom required, and if the need arises they should be carried out at a later time.

A separate survey of results was made of patients operated upon from 1939 to 1947 (378), and of those operated upon from 1947 to 1950 (322). Three deaths occurred.

Cures were reported in 40 per cent of the first group and in 60 per cent of the second group. Seventy-nine per cent of the patients in the first group were able to carry on with their former occupation, even though they had slight residual symptoms. Eighty-three per cent of the second group were able to carry on with their former occupation with slight residual symptoms.

The results in compensation cases were found to be less satisfactory than those in private patients.

Better criteria for operation and improved surgical technique were thought to account for the higher percentage of cures in the second group of cases.

HOWARD A. BROWN, M.D.

SURGERY OF THE THORAX

CHEST WALL AND BREAST

Breast Lesions. THADDEUS L. MONTGOMERY, PAUL A. BOWERS, and H. WINFIELD TAYLOR. *Obst. & Gyn.*, 1953, 1: 394.

The authors present an analysis of the records of 4,651 patients seen in obstetric and gynecologic office practice. A total of 24,527 examinations of the breasts were made, and 479 disturbances of the breasts were found. The lesion most commonly observed was fibrocystic disease (in 295 cases); fibroadenoma of the breasts was present in 42 cases; carcinoma was present in 32 cases; mastodynia, a diagnosis of vague lineaments, accounted for 32 cases; and intraductal papilloma, as evidenced by serous discharge from the nipple on histologic examination, accounted for 14. There were 33 miscellaneous lesions. The incidence of carcinoma among breast disturbances was 1 in 14.4 cases, and its incidence in the entire patient material was 1 in 145 cases.

Biopsy was performed in 182 cases, was advised in 64, and lesions were observed in 233 cases. In the course of these activities, 32 cases of breast cancer were discovered. The relationship of the obstetrician and gynecologist to this problem is discussed, properly noting that they have the opportunity of frequently examining these patients and securing early detection of serious lesions.

LEROY J. KLEINSASSER, M.D.

Adrenalectomy and Oophorectomy in the Treatment of Advanced Carcinoma of the Breast. CHARLES HUGGINS and THOMAS L-Y. DAO. *J. Am. M. Ass.*, 1953, 151: 1388.

Cancer of the breast is considered not as a single pathological state but a complex group of various categories with differing functional and clinical characteristics. Some of these neoplasms in both sexes are composed of cells of sufficient functional maturity that they undergo a decrease of activity when critical quantities of supporting hormones are removed through surgical removal of their sources. When gonads and adrenal glands are removed the level of physiologically active steroids is greatly reduced and some mature mammary cancer growth is depressed.

The authors consider the formation of the acini in mammary carcinoma a positive process directly attributable to secretion induced by hormones; the absence of secretion in the lumen and the ingrowth of cells, as in the lumen of the ductal carcinoma, indicate a nonhormone dependent growth.

The microscopic appearance of the neoplasm is frequently of value, as a first approximation, in differentiating between dependent and nonresponsive cancers. Most of the cancers that were predominantly papillary neoplasms or adenocarcinomas regressed after the surgical procedures; duct carcinomas rarely, and undifferentiated mammary cancers never, responded favorably. These histological criteria, while not invariably permitting a successful prediction of functional response, or its lack, were helpful. The determination of the titer of estrogenic substances in the urine preoperatively was also useful in the clinical management of cancer of the breast; high values in the absence of gonadal function indicate adrenal cortical activity of significance.

Adrenalectomy, or this operation combined with oophorectomy, has induced significant and prolonged regression of extensive mammary cancers in women who had not responded to earlier treatment with testosterone and roentgen irradiation of the ovaries. Adrenalectomy alone has provided a remission in men and women in whom the disease was advancing despite removal of testes or ovaries. The surgical methods are useful in appropriate cases of cancer of the breast in the human male and female.

The mechanism of improvement after adrenalectomy in cancer of the female breast seems to be the withdrawal of critical amounts of hormones similar to those formed in the ovary. After adrenalectomy in women who have undergone oophorectomy the excretion of estrogen in the urine is abolished. Increased pituitary activity of the type that occurs in postmenopausal women is not incompatible with regression of mammary cancer.

A report on 55 patients with mammary cancer who were treated by adrenalectomy is presented. The mortality rate was 5.5 per cent. The elapsed time since operation is from 2 to 24 months. The evidence presented in the series indicates that survival after adrenalectomy and oophorectomy is longer than with other presently accepted methods of palliation. The surgical procedure has induced important remissions in patients in whom irradiation and testosterone have been ineffective.

W. FOSTER MONTGOMERY, M.D

The Technique of Radical Breast Amputation with Removal of Pectoral Muscles and Dissection of the Internal Mammary Supraclavicular and Axillary Regions (Technique d'amputation large du sein avec ablation des muscles pectoraux et triple curage mammaire interne, sus-claviculaire et axillaire). HENRI REDON and J. LACOUR. *J. Chir.*, Par., 1953, 69: 197.

The extirpation of mammary cancer and three tributary glandular territories (internal mammary, supraclavicular, and axillary spaces) is described.

The incision, which circumscribes the breast and extends upward to the upper border of the clavicle, is made 4 fingerbreadths away from the tumor. Larger incisions are considered superfluous. If it is decided to clear the supraclavicular space, the incision is extended 4 cm. upward from the clavicle

The skin flap and the median portion of the breast are dissected with an electric knife outward, the aponeurosis of the pectoralis major muscle is incised along the first 5 costal cartilages, the chondrosternal insertion of the aforementioned muscle is severed and reflected outward, and the perforating branches of the internal mammary artery are ligated. The insertions of intercostal muscles are stripped from the second, third, and fourth costal cartilages by means of electrocoagulation, and all 3 cartilages are sectioned on a bias. Their lateral segments are raised by silk sutures placed around them. This maneuver provides exposure of the internal mammary space. After removal of the celluloglandular bloc, a braided nylon suture placed around the overlapping ends of each cartilage provides sufficient coaptation.

The clavicular insertion of the pectoralis major muscle is severed, the subclavian muscle is resected, but the clavicle is not sectioned. Either the supraclavicular or the subclavicular approach may be used for dissection of the supraclavicular space. The last mentioned route is employed only if the patient refuses to have a scar above her clavicle. The authors prefer a section of the clavicle in an oblique direction to disarticulation.

Dissection of the axillary space is accomplished in the classical manner. JOSEPH K. NARAT, M.D.

TRACHEA, LUNGS, AND PLEURA

Repair by Full-Thickness Skin Graft of Penetrating Wounds of Intrathoracic Trachea. JOSEPH M. HANNER and SIDNEY H. COHEN. *J. Thorac. Surg.*, 1953, 25: 380.

The subject of this report, a moribund young Korean soldier, was saved from death by a timely thoracotomy and a full-thickness skin graft applied to the tracheal defect which was found. Actually two defects were found in the trachea, just above the level of the carina, each about 2 cm. long. The anterior one was closed by interrupted sutures. The posterior one, lying on a bruised but intact esophagus, presented difficulties in approach and manipulation of the injured structures. A free full-thickness skin graft was taken from the anterior abdominal wall and wrapped around the posterior tracheal defect, with its epidermal surface turned in against the actual tracheal opening. It was sutured in place with interrupted sutures which secured it adequately above and below the limits of the defect and anchored it as a cuff around the trachea anteriorly as well. The patient made a good recovery from the operation and was reported to be doing well 2 months later.

BENJAMIN F. LOUNSBURY, M.D.

Tracheoesophageal Fistula Due to Nonpenetrating Injury. M. E. DE BAKEY and JOHN P. HEANEY. *Am. Surgeon*, 1953, 19: 97.

Trauma is a rare cause of tracheoesophageal fistula, most of the cases developing as the result of neoplasm or infection.

The authors report the case of a 22 year old man with a tracheoesophageal fistula resulting from nonpenetrating trauma. The lesion was successfully treated surgically by division of the fistula through a transpleural approach from the right side and closure of the esophageal and tracheal openings in two layers with interrupted silk sutures.

The literature revealed only 5 previously reported cases, 3 of which were repaired surgically.

The most characteristic manifestation of fistula is the occurrence of a sudden strangling sensation with severe paroxysms of coughing almost immediately after the swallowing of food or fluids. Roentgenographic studies following the instillation of iodized oil in the trachea demonstrate the communication with the esophagus. Additional information may be obtained by bronchoscopy or esophagoscopy.

In small fistulas, closure has sometimes been accomplished by chemotherapy and local cauterization, but surgical intervention with anatomic repair of the opening in the esophagus and trachea is considered the procedure of choice in the more extensive lesions. S. LLOYD TEITELMAN, M.D.

Tracheal Resection and Replacement with a Prosthesis. ROBERT L. CRAIG, GEORGE W. HOLMES, and ELMER J. SHABART. *J. Thorac. Surg.*, 1953, 25: 384.

The results of three different groups of experiments with tracheal resection and replacement with prosthesis are given.

In the first group of dogs a complete cylinder of trachea, from 2 to 5 cm. in length, was excised from the cervical area and the prosthesis was placed extratracheally over each of the cut ends and thus over the intervening gap. All 6 dogs in this group died within 4 months because of marked stenosis of both resected ends. There was at the time of death no evidence of regeneration of the mucosa along the inside of the tube.

In the second group (18 dogs) segments of cervical trachea were removed just as in the first group. However, in this group the prosthesis was placed endotracheally. By the ingenious incorporation of wire into the molded polythene prosthesis it was possible to suture the prosthesis into place in the trachea without having the sutures cut through. In each instance the prosthesis was left in place until the animal died or was sacrificed. When the upper end of the prosthesis pressed on the larynx (in 2 dogs) it caused stenosis and death. In 5 of the remaining 16 dogs the tube slipped and caused death either because of acute obstruction or because the unsupported gap tissue contracted and produced stenosis. All of the dogs exhibited some degree of chronic bronchial irritation. The lack of tracheal epithelium across the gap resulted in poor and incomplete evacuation of secretion. Even those dogs which appeared to be in good health at the time of being sacrificed showed some pneumonitis.

In the third group (4 animals) the resection was performed in the thorax and the resected segment of

trachea was replaced with endotracheal prosthesis just as in the second group. Two of the dogs died immediately after operation from atelectasis. One dog died at 12 months, from empyema, and the last one of the group was sacrificed, in apparent good health, at 14 months. There was no evidence of regeneration of the cartilage in any of the animals except 1, in which it was truly minimal.

The authors report on 1 case of resection of the trachea in a human being for squamous cell carcinoma. Although windows can be successfully removed from the trachea, resection of a cylindrical section of trachea poses several problems. First, it is difficult to achieve an airtight replacement, with the result that mediastinitis and infections of the pleural cavity ensue. Second, a prosthesis may slip and cause obstruction; if it is removed the fibrous tissue replacing the trachea may contract and produce stenosis. In either event, secretions of the lung distal to the resection are inadequately cleared.

BENJAMIN F. LOUNSBURY, M.D.

The Value and Limits of Bronchoscopy in the Diagnosis and Therapy of Surgical Lung Disease (Wert und Grenzen der Bronchoskopie in Diagnostik und Therapie chirurgischer Lungenerkrankungen). KURT SPOHN. *Langenbecks Arch. u. Dtsch. Z. Chir.*, 1953, 273: 467.

The author has had a great deal of experience with bronchoscopy at the University Clinic of Heidelberg, and he describes some of his experiences.

Bronchoscopy is extremely important and necessary in the diagnosis of intrabronchial processes. Up to 70 per cent of all tumors can be reached through the bronchoscope, and biopsies can be taken to determine whether a tumor is benign or malignant. Bronchoscopy has been helpful also in cases in which no shadows or outlines could be seen in the roentgenogram, and it has been especially valuable in cases in which irregularities were shown on the roentgenogram, but no definite diagnosis could be established. The tissue removed by biopsy is then examined microscopically and treatment is started as indicated. The author especially mentions 2 patients, both of whom had very similar symptoms, but after bronchoscopy and biopsy it became apparent that one had an ulceration and stenosis of a bronchus caused by tuberculosis, while the second patient was shown to have a cancer of the lower lobe bronchus.

At the present time, the upper lobe bronchus and its segments can be quite well visualized with special endoscopic instruments, but taking biopsies is still quite difficult. Even where tumors are out so far in the periphery that they can no longer be visualized, Papanicolaou stains (stains made from cells which are obtained by lavage of that area) have been a great help in diagnosis. The bronchoscopy expert can offer advice as to the possibility of operative treatment of a tumor, based on its situation, but this is not always 100 per cent reliable. In infectious lung disease, however, the roentgen picture is the main diagnostic measure and bronchoscopy is used only rarely.

Bronchoscopy, however, also has therapeutic possibilities. Bronchoscopic suction proved very valuable in the treatment of bronchiectasis and abscesses, in addition to aerosol treatment and postural drainage. After surgery, the "tracheobronchial toilette" is especially helpful to prevent postoperative atelectasis. This tracheoscopy should be performed after every surgical procedure with general anesthesia, but only an experienced anesthetist should do the suctioning. M. LÓPEZ BELIO, M.D.

Biopsy Techniques in the Diagnosis of Intrathoracic Lesions. Clifford F. Storey and Benedict M. Reynolds. *Dis. Chest*, 1953, 23: 357.

Direct biopsy is the most certain means of diagnosing intrathoracic lesions. Although biopsies at the time of bronchoscopy or esophagoscopy are proved and accepted methods, their limitations are obvious. Needle biopsy is considered unsafe and inadequate. The value of three other biopsy techniques is demonstrated by a series of case presentations.

Excision of the deep cervical fat pad with its contained nodes may be accomplished through a small supraclavicular incision under local anesthesia and offers excellent diagnostic material, as well as evidence as to operability and curability. Five cases which presented diagnostic problems are described, in which biopsy of the deep cervical fat pad permitted accurate diagnosis and therapy. Three cases showed Hodgkin's disease in the nodes; 1 patient had Boeck's sarcoid and another had inoperable anaplastic carcinoma of the lung.

"Trial of irradiation" in mediastinal tumors, as elsewhere in the body, is often equivocal. Biopsy is necessary for accurate diagnosis and rational therapy. Exploratory transthoracic mediastinotomy through a posterolateral intercostal incision makes this possible for all but the very poor risk patient. A 30 year old male with signs and symptoms of a malignant mediastinal tumor proved to have a tuberculoma on biopsy. Failure of a lesion suggestive of lymphoblastoma to respond to x-ray therapy led to biopsy, with a resultant diagnosis of Boecks' sarcoid. This was followed by a spontaneous remission which might well have confused the picture greatly had it followed the x-ray therapy more closely. Another patient with findings suggestive of a left ventricular aneurysm proved to have a sclerosing hemangioma of the ventricular wall, with great effect upon the therapy and prognosis.

Lung biopsy through open thoracotomy is the third method advocated. The intercostal incision is centered over the presumed site of origin of the lesion, and the procedure is well tolerated. By this means sarcoidosis, eosinophilic granuloma of the lung, and carcinoma were differentiated from what appeared to be tuberculosis.

The accuracy and safety of these three types of biopsy techniques warrant their more frequent use by thoracic surgeons. JOHN J. MURPHY, M.D.

The Use of Suture Constriction of the Upper Lobe in the Treatment of Pulmonary Tuberculosis. (Paulino Procedure). PAUL T. DECAMP, THOMAS G. BAFFES, JOHN W. OVERSTREET, and ALTON OCHSNER. *J. Thorac. Surg.*, 1953, 25: 219.

One of the authors (P.T.D.), impressed by a partial modified thoracoplasty performed by Fernand Paulino of Rio de Janeiro in 1949, believed it to be the ideal type of thoracoplasty for advanced pulmonary tuberculosis. This type of operation is a single nondeforming procedure with a minimal loss of costal cage and a maximal preservation of respiratory function. It employs the oldest, soundest, and most accurate method of constriction in surgery, namely, the suture ligature.

Since September, 1949, the authors have employed Paulino's operation 34 times with gratifying results. Performed as a single operation with limited resection of the costal cage, deformity has been slight and the loss of respiratory function has been minimal. Bilateral operations were performed in 3 cases. Complications have been few and control of the disease compared favorably with that in the multistaged selective thoracoplasty of the Alexander type.

Collapse and compression of the diseased portions of the lung are obtained by a series of three No. 10 crochet cotton ligatures placed about the lung and the overlying parietal structures which have been freed from the chest wall according to the Carl Semb technique. A limited rib resection was performed to permit ready access for the pneumolysis, to obliterate the extrapleural space created by the pulmonary collapse, and to prevent over-expansion of the lung below the level of the collapse.

A diagrammatic sketch of the technique in stages is presented and the technique is described in detail. The unique feature of the method is the means of achieving collapse and preventing re-expansion of the diseased lung. The apex of the pleura and the underlying lung is grasped with a large curved Kelly clamp. Beginning near the apex and concluding below the level of the grossly diseased lung, three concentric pursestring sutures of No. 10 crochet cotton are placed about the lung and the overlying structures. Each ligature is caught in the pleura, the overlying tissues, or the lung itself at three or four points to prevent slipping. As each ligature is placed, it is drawn up snugly about the underlying diseased lung and tied. Silver clips are placed on the lowest ligature as markers. At the conclusion of the operation all of the grossly diseased portions of the lung have been uniformly and concentrically collapsed and compressed under direct vision in a far more accurate and dependable manner than is possible by rib resection alone. Laceration of the pleura does not significantly complicate the procedure. A catheter is inserted for expansion and postoperative water trap drainage.

Special indications for the Paulino procedure are: (1) the presence of bilateral advanced upper lobe disease, (2) the occurrence of unilateral upper lobe disease in a patient who has previously had contralateral thoracoplasty or lobectomy, (3) paramediastinal cavitary disease, (4) unilateral disease in the presence of limited respiratory reserve, and (5) a particular desire to avoid deformity as in a young individual. The contraindications are the same as for the standard type of thoracoplasty.

A technique of partial thoracoplasty, extensive pneumolysis, and collapse and compression of the lung by suture ligatures is presented. A 31 month's experience in 31 cases, including bilateral operation in 3 cases, indicates that this procedure is safe and reliable when applied to suitable advanced tuberculous lesions of the upper lung. The operation is performed in one stage; costal resection, deformity, and loss of respiratory function are reduced to a minimum.

The procedure is recommended particularly when bilateral surgical procedures seem indicated, or when the respiratory reserve is limited. As the operation has several additional advantages it may also be used by election rather than the more extensive multistaged selective thoracoplasty of the Alexander type. JOHN H. MOHARDT, M.D.

The Results of Thoracoplasty for Pulmonary Tuberculosis, 11 to 16 Years After Operation. ARTHUR H. AUFSES and MAURICE S. HARTE. *J. Thorac. Surg.*, 1953, 25: 329.

This article is a follow-up report on 90 thoracoplasties performed 11 to 16 years previously for pulmonary tuberculosis and originally reported in 1941. Of the 80 patients still alive in 1941 (6 had died postoperatively and 4 others had died within the first year after operation), 66 were still alive in 1951, 63 with inactive disease, 2 with active tuberculosis and 1 patient was with arrested disease. Four of the 14 who died between 1941 and 1951 had inactive disease at the time of their deaths.

The disease has remained inactive in 57 of the 64 in whom it was considered arrested at the time of the original report. There were 6 late sputum conversions among the 16 who still had positive sputum at the time of the first report.

The authors emphasize the advantages of thoracoplasty, one of which is that early favorable results persist over long follow-up periods. This operation, coupled with today's antibiotics, should produce very good results in a high percentage of properly selected patients. BENJAMIN F. LOUNSBURY, M.D.

Valvulotomy for Pure Pulmonary Stenosis. FREDERIK THERKELSEN. *Acta. chir. scand.*, 1953, 104: 353.

The author reviews briefly the matter of the surgical correction of pulmonary stenosis, and considers particularly the cases having a pure lesion.

The work was carried out at the Rigshospitalet (University Hospital) in Copenhagen, Denmark, in the period between January, 1951 and April, 1952.

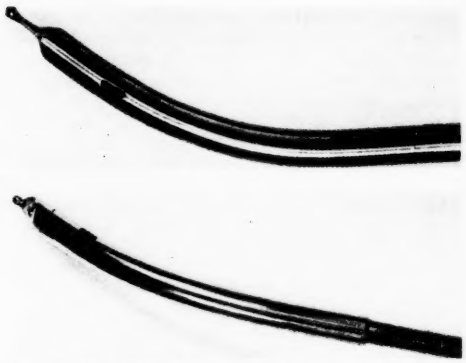


Fig 1. (Therkelsen). Upper and lower. A combined knife and dilator to reduce the number of times an instrument has to be passed.

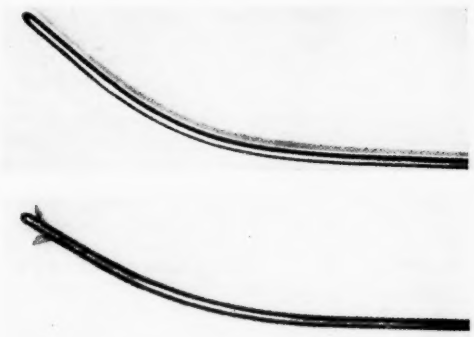


Fig. 2. Upper and lower. A special knife which may be unfolded after introduction.

In outlining the operative technique, the author indicates a preference for a posterolateral incision through the bed of the fifth rib; he states that thus it is possible to carry out a Blalock or other procedure if the situation is recognized as a tetralogy of Fallot. Nevertheless he comments on his interest in doing a pulmonary valvulotomy under this condition anyway, and records 16 pulmonary valvulotomies in a total of 142 operations for tetralogy of Fallot.

The present series consists of 12 patients, 6 of whom had pure pulmonic stenosis; 1 had pulmonic stenosis and patent ductus arteriosus; 4 had pulmonic stenosis and an atrial septal defect; and 1 had pulmonic stenosis with a constrictive pericarditis. This last case constituted the only death, which occurred 2 days after operation and was due to lobar pneumonia.

The author favors the ventricular approach of Brock and he uses a variety of instruments to accomplish this operation.

In 3 instances access to the pulmonary valve had been gained through the pulmonary artery with use of the technique of Sondergaard. Operative complications have been relatively minor. No end results are given due to the short term follow-up, but generally the immediate results appear to have been good. HIRAM T. LANGSTON, M.D.

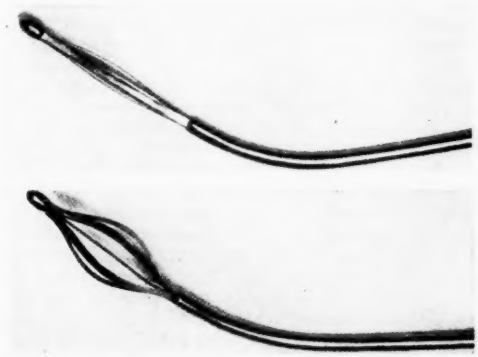


Fig. 3. Upper and lower. A dilator resembling the one described by Mueller and Longmire, and Potts. It has the advantage of not injuring the myocardium while it is being introduced.

Experiences with Pulmonary Resection in Bronchiectasis (Erfahrungen mit der Resektionsbehandlung von Bronchiecktasen). E. DERRA and F. KOSS. *Deut. med. Wschr.*, 1953, 78: 457.

The authors review a rather large series of patients who were treated surgically for bronchiectasis. In most of the patients bronchography was performed with use of a water-soluble preparation. The value of such a water-soluble preparation is evident. The authors likewise have carried out studies on pulmonary function in a majority of the patients operated upon.

The series includes 94 patients who were not operated upon, either because the bronchiectasis was minimal in degree or because the patients refused surgery. One hundred and seventy-seven partial resections of the lung for bronchiectasis were performed in 174 patients, with an average mortality of 12.7 per cent. In those patients in whom bronchiectasis alone existed, the mortality rate was only 7.4 per cent. In contrast to this, where bronchiectasis was complicated by associated abscess formation the mortality rate was 24.5 per cent. Lobectomies or segmental lung resections were accomplished in 31 children with only 1 death.

It is significant that adults who have had pneumonectomies or bilateral lobectomies for extensive bronchiectasis usually manifest a breathing deficit on exertion, in contrast to the results following similar procedures on children. The authors believe that as a rule bronchiectasis is acquired rather than

congenital, and this indicates that the pressure of inflammatory lymph nodes at or near the origin of the major bronchi may very well play a part in the etiology. ORVILLE F. GRIMES, M.D.

Pulmonary Hematoma. JOHN M. SALYER, HU A. BLAKE, and JAMES H. FORSEE. *J. Thorac. Surg.*, 1953, 25: 336.

Three young adult males with a history of antecedent injury to the chest wall developed persistent, solitary, and discrete shadows in the pulmonary fields. In the absence of any appreciable change of these roentgenographic findings after periods of 8 to 12 weeks, thoracotomy was indicated and performed.

In each instance a pulmonary hematoma was found. Lobectomy or segmental excision was performed. Although each of the patients had had a rib fracture as the concomitant or causative injury producing the hematoma, in 1 instance the fracture was contralateral to the hematoma. The authors point out the impossibility of distinguishing between a pulmonary hematoma and a neoplasm in some cases. BENJAMIN F. LOUNSBURY M.D.

Surgical Treatment of Bronchial Carcinoids and the Problem of Their Malignancy (Ueber die chirurgische Behandlung der Bronchialcarcinoide und das Problem ihrer Malignitat). E. K. FREY and H. LÜDEKE. *J. internat. chir.*, Brux., 1953, 13: 1.

Approximately 300 cases of benign epithelial bronchial tumors have been described in the literature, and the authors report 12 additional tumors of this type found among 250 resected bronchial or pulmonary neoplasms.

It is believed that polypoid epithelial tumors should be called carcinoids or cylindromas in preference to the term "benign adenomas," because they show signs of doubtful or limited malignancy. The results of histologic examination of biopsies obtained through a bronchoscope are not always reliable. Furthermore, the extent of extrabronchial expansion of the tumor cannot be determined by bronchoscopic examination. Anaplasia and atypical nuclei may not be found in biopsies and yet malignant growth and the formation of metastases may take place. Therefore, pulmonary resection is the method of choice in the treatment of bronchial carcinoids. Bronchoscopic extirpation is indicated only for small, pedunculated tumors.

The incidence of carcinoids in women is slightly greater than in men. The tumors are most frequently detected in the third decade of life. The clinical picture is dominated by a single or recurrent hemoptysis, fever, cough, and expectoration.

JOSEPH K. NARAT, M.D.

Bronchial Carcinoma Appearing as a Round Tumor (Das als Rundtumor erscheinende Bronchialcarcinom). GERHARD HARTMANN. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1953, 274: 190.

The author discusses bronchial carcinomas appearing as round circumscript lesions, with their own typical symptomatology and specific clinical picture. These tumors do not represent a histopathological entity. Found anywhere in the lungs, they can originate from a main bronchus, not only from the smallest branches of the bronchial tree. Their circumscript and round shape is responsible for the history and the symptoms which are difficult to differentiate and diagnose. Historic data are vague, with very few complaints except headache and fatigue. Typical manifestations of pulmonary carcinoma, like cough and bloody expectoration, loss of weight, and pain, are absent. The patients are in good physical condition and strong. The complaints go back as far as 6 months. Physical findings are inconclusive as to pulmonary tumor. A secondary anemia may be present in some cases, and sedimentation rates are normal or only moderately elevated.

Only x-ray studies offered some suspicion for malignancy, but no definite conclusions could be made.

Negative bronchoscopic findings may rule out a bronchial carcinoma originally from the main or lobar bronchi, but they do not exclude the possibility of a round tumor. Bronchoscopy and biopsy are only rarely possible because of technical difficulties. Solitary pulmonary metastasis of hypernephroma, malignant goiter, mammary cancer, sarcoma, cancer of the prostate and ovaries may also look like round tumors. The history will help in differentiating the echinococcus (skin) test. Dermoid cysts and other benign lesions such as lipomas, fibromas, teratomas, or neurinomas will have to be excluded. Blood dyscrasias can be differentiated by the fact that they alone respond to x-ray therapy promptly.

One also has to think of pulmonary infarcts, aneurysms of the aorta, actinomycosis, and pulmonary abscess. All of these factors have to be rated carefully before surgery is indicated.

All of the round tumors of primary origin metastasize very late and develop mostly in the periphery of the lungs. At the beginning and for a long time they grow only by expansion without infiltration. The patients are usually in good condition, cachexia setting in very late. Surgery gives more gratifying results in these cases than in the hilar type of bronchial carcinoma. Lobectomy is the procedure of choice in early cases, having an advantage over pneumonectomy which is necessary for the hilar type of bronchial carcinoma.

In cases of round tumors that come to surgery at a very late stage, chest wall resection has to be carried out because of the invasive tendency in latter stages. Echinococcal cysts, as well as benign round tumors, must also be removed. The world literature includes 62 cases in which lobectomy was performed for metastatic lesions (Denk). A number of the patients survived 5 years. The indications for the removal of metastases are:

1. Radical removal of the primary tumor
2. Absence of multiple metastases
3. Good general condition

Early diagnosis is very difficult with clinical and laboratory means; therefore, exploratory thoracotomy is necessary.

The author presents 11 case histories and pictures.

OTTO WEISS, M.D.

Cancer of the Lung in Physicians. ERNEST L. WYNDER and JEROME CORNFIELD. *N. England J. M.*, 1953, 248: 441.

Exposures to possible respiratory irritants were studied in 63 physicians with cancer of the lung and 133 physicians with cancer outside of the respiratory tract. A highly significant association between the use of tobacco and the development of pulmonary cancer was found among physicians.

The estimated mortality from cancer of the lung rose from 10 per 100,000 among nonsmoking physicians to 133 per 100,000 among physicians smoking 35 or more cigarettes a day.

There were no significant differences in exposure to respiratory irritants other than tobacco among the two groups. ROBERT L. CRAIG, M.D.

Limitation of Indications for Resection of Bronchial Carcinoma (Zur Indikationsbegrenzung der Resektionstherapie beim Bronchialcarcinom). M. SCHWAIGER. *Chirurg*, 1953, 24: 97.

In spite of recent advances in surgery of bronchial carcinoma, the 5 year survival period can be obtained in no more than 25 per cent of the operative material. Further improvement in survival can be expected only from an earlier diagnosis. In the author's material one-third of the patients were dead within 1 year following the operation, while the intervention itself carried an operative mortality of from 20 to 25 per cent.

Histologic classification of bronchial carcinoma is difficult because mixed forms are frequent and various degrees of differentiation may be found in the same tumor. However, the following 4 groups, which occur in the descending order of frequency, may be distinguished: squamous cell epithelioma, microcellular carcinoma, adenocarcinoma, and completely undifferentiated tumors. The microcellular formations are much more malignant and form metastases earlier than squamous cell cancers. Postmortem findings as well as clinical experience show that pneumonectomy does not produce cure of this type of carcinoma and that chances of prolonging life by operation are slim.

The author favors lobectomy in selected cases of squamous cell carcinoma because, although the operation is not as radical as pneumonectomy, it carries a lesser operative risk, does not markedly impair respiration, and a 3 year survival period can be obtained in from 50 to 60 per cent of the cases. Only well circumscribed tumors located at the periphery of the lung should be treated in this manner, provided that inspection of the hilus glands does not justify suspicion of metastases. When only a palliative procedure comes into consideration, lobectomy may be preferable to pneumonectomy because it impairs the respiration and circulation to a lesser degree and occasionally produces surprising subjective improvement.

Extended resection of tumors invading the mediastinum is employed by the author only exceptionally because the operative risk is exceedingly high and, on account of hematogenous dissemination of the tumor cells, the intervention accomplishes only palliation. JOSEPH K. NARAT, M.D.

An Experimental Evaluation in the Dog of Bronchial Transplantation: Bronchial, Tracheal, and Tracheobronchial Resection with Reconstruction. LAWRENCE B. KIRILUK and K. ALVIN MERENDINO. *Ann. Surg.*, 1953, 137: 490.

Herein are reported the results of 102 resections and reconstructions of various tracheal and bronchial segments, performed on 71 adult dogs. The results were evaluated by bronchoscopy, and gross and microscopic anatomic examinations. A smoothly epithelized and unnarrowed anastomosis was considered excellent; a healed but rough suture line was classified as good; a fair result indicated the presence of granulations and narrowing (up to 40%) of the lumen.

Resection of one of the stem bronchi with anastomosis to the carina was successful in nearly all of the 29 operations.

When the carina, with or without segments of the stem bronchi, was resected a good result was obtained only if there was good approximation without luminal disproportion. Thirteen operations were done with 6 good or excellent results. When pneumonectomy was added to the carina resection, the results were good in all of the patients surviving surgery (5 of 8).

In 13 animals, one stem bronchus was severed at the carina and anastomosed to the trachea above, or to the opposite stem bronchus below the carina. There were 8 excellent to fair results.

The results of all resections of the trachea were poor. Strictures developed in all cases and seemed to follow the use of catgut which permitted separation of the cartilage ring that had been brought together under some tension. When a tantalum gauze cylinder was used to bridge the defect (4 cases), 3 patients survived long enough to demonstrate (after about 6 weeks) collapse of the tantalum tube, which was perhaps caused by pressure of the food masses passing down the esophagus.

In general, nonabsorbable sutures were preferred. When faced with the problem of suturing tubes of various sizes, the surgeon may tailor the anastomosis by narrowing the membraneous portion of the trachea or bronchus by tuck sutures, by using oblique lines of section, or by suturing two bronchi end-on with a third bronchus.

The transplantation of bronchi is feasible if the distance which the lung segment is to be moved does not exceed the length of the pulmonary veins, if the aortic arch is not in the way, and if the exposure for suture is adequate. LEONARD D. ROSENMAN, M.D.

Decortication of the Lung with Considerations of Functional Results (Die Dekortikation der Lunge unter Berucksichtigung funktioneller Ergebnisse). M. WERBER and J. MAURATH. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1952, 274: 1.

The authors present a series of 21 cases of tuberculous and nonspecific empyemas treated by decortication, decortication with muscle flaps, and thoracoplasties to obliterate persistent cavities in the pleural space. In several instances, lobectomy for underlying disease was accomplished when such was indicated. The authors suggest that decortication should be performed early, before irreversible fibrous tissue replacement has occurred in the pulmonary parenchyma.

Functional studies indicated that decortication alone gave the best functional results as measured by maximum breathing capacity and increased minute volume levels. The combination of decortication with accessory procedures such as thoracoplasty and the use of muscle flaps produced functionally poorer results.

Functional studies were carried out in 18 patients following the decortication procedure. In these cases, the arterial oxygen content was normal, indicating a marked improvement over the preoperative state. In addition, a general improvement in ventilation occurred as measured by an increase in the maximum breathing capacity, which was increased by an average of 6 liters per patient.

ORVILLE F. GRIMES, M.D.

Solitary Pleural Mesotheliomas. HECTOR W. BENOIT, JR., and LAUREN V. ACKERMAN. *J. Thorac. Surg.*, 1953, 25: 346.

These authors offer an excellent presentation on the subject of pleural mesotheliomas. In the diffuse type of this tumor, which is highly malignant, epithelial elements in a tubular pattern are distributed in a fibrous stroma. On the other hand, the solitary type of tumor may be either benign or of low grade malignancy; the former shows intrapleural extensions from pleural origins, whereas the latter invades subpleurally from its pleural origin. Although both groups of solitary tumors are fibrous and contain no epithelial cells, the histologic distinction between benign and malignant types can be made.

It is often very difficult to differentiate these tumors from other intrathoracic tumors by any means. Clinical signs and symptoms are few and not particularly helpful in making the diagnosis.

The authors present 6 new cases of benign solitary fibrous mesotheliomas. The characteristics of these tumors are discussed, along with those of 11 previously reported benign and malignant solitary pleural mesotheliomas. Of the authors' patients, 3 had marked pulmonary osteoarthropathy, as a result of the large size of the tumors which had been present for long periods. In each instance the osteoarthropathy regressed rapidly and completely after removal of the tumor.

The only satisfactory treatment for benign or malignant solitary pleural mesothelioma is surgical removal.

BENJAMIN F. LOUNSBURY, M.D.

Surgery of the Pleura (Die Chirurgie der Pleura). F. SPATH-GRAZ. *Langenbecks Arch. u. Dtsch. Z. Chir.*, 1953, 273: 482.

The author points out the importance of thoracic surgery, especially with relation to the prevention of secondary processes, such as fibrosis, which involve the lung parenchyma, bronchi and diaphragm.

In hemothorax, the gross blood is not resorbed, and if it is not removed the results are fibrothorax, reduction in the function of the lung, empyema, and lung abscess. Thoracentesis is done within 48 hours after trauma, and subsequently in 24 to 48 hours until the pleural cavity is dry. A 50 per cent reduction in infection may be expected when this practice is followed. If it is not successful, thoracotomy is indicated.

In idiopathic spontaneous respiratory hemothorax and pneumothorax, thoracotomy has lately become the treatment of choice, especially in the chronic cases. There is, however, a tendency to recurrence. The etiologic factors are rupture of the subpleural vesicle and the presence of congenital cysts of the lung.

The idiopathic spontaneous course must be followed up by intrapleural pressure recordings. If healing is not spontaneous, local therapy is instituted with diiodine solution or ½ per cent silver nitrate solution. The pleural cavity must be connected with the pump. If there is still no improvement, thoracotomy is recommended. The condition is cystic. Segmental resection or lobectomy should be carried out. In spontaneous bilateral pneumothorax, thoracotomy gives good results.

In nonspecific empyema, treatment consists of thoracentesis with antibiotics. Early decortication gives good results. Removal of the organized empyema as a unit, however, gives much better results because there is no reduction in the function of the lung, and no scar formation. In tuberculosis, however, the indications are limited, and treatment must often be combined with partial resection of segments of the lung.

In the cavity, following pneumonectomy, the usual complications are empyema, and respiratory and circulatory disturbances. Thoracoplasty is indicated in many cases, and reduces the incidence of respiratory and circulatory dysfunction in later years. A shift of the mediastinum may remain without symptoms for a long time, but sooner or later trouble arises. After resection of the lung, filling the cavity with air, oil, or other foreign material has not given good results. Methylmetacrylate in the form of the so-called lucite ball has given better results, mostly in animal experiments.

The prognosis in cases of sarcoma of the pleura, and especially in endothelial tumors, is better when roentgen therapy and treatment for loss of nitrogen are administered.

M. LÓPEZ BELIO, M.D.

Respiratory Acidosis During Intrathoracic Surgery: The (Overholt) Prone Position. BENJAMIN E. ETSTEN. *J. Thorac. Surg.*, 1953, 25: 286.

This article is concerned with a review of the ideas regarding respiratory acidosis occurring during intrathoracic surgery, and with further studies to elucidate the mechanisms involved.

In order to evaluate fully the effect of the Overholt prone position on carbon dioxide excretion during pulmonary surgery, such variables as preoperative sedation, depth of ether anesthesia, change of position, opening of the pleural cavity, and pulmonary resection have been serially analyzed.

The effect of preoperative sedation on the arterial blood carbon dioxide and oxygen saturation is listed in tables. The significance of this evaluation is that the depressant effects of sedation on respiration are not predictable in patients with pulmonary lesions requiring thoracic surgery. The figures indicate that preoperative sedation with phenobarbital plus morphine and scopolamine can cause a retention of carbon dioxide in some patients. The postsedation values for arterial oxygen saturation were within a normal range.

Table 4 in the original article shows the effect of light and moderate surgical states of ether anesthesia on the arterial blood and *p*H, carbon dioxide tension, and oxygen saturation before opening of the pleura with the patient in the prone position. Analyses of the effects of lobectomy, pneumonectomy, and moderate surgical states of ether anesthesia on the excretion of carbon dioxide are shown.

This study is an evaluation of the etiological factors in respiratory acidosis during thoracic surgery. It was shown that the prone (Overholt) position does not prevent an increase in carbon dioxide tension during lobectomy or pneumonectomy.

Dangerously high levels of carbon dioxide tension were encountered when the hemothorax was open and the patients were allowed to breathe spontaneously during ether anesthesia. A lowering of the *p*H and an increase in the carbon dioxide tension occurred during the surgical state of ether anesthesia with the patient in the prone position.

Analysis of the effect of lobectomy, pneumonectomy, depth of ether anesthesia, and duration of operation revealed that (1) an increase in carbon dioxide tension may occur with the same frequency and severity during lobectomy as during pneumonectomy, and (2) the severity of the respiratory acidosis is not a factor of time but a factor of the depth of ether anesthesia during intrathoracic surgery. J. H. MOHARDT, M.D.

HEART AND PERICARDIUM

The Role of the Bronchial Veins in Mitral Stenosis. J. C. GILROY, PAUL MARCHAND, and V. H. WILSON. *Lancet*, Lond., 1952, 2: 957.

Six cases of mitral stenosis were studied anatomically at autopsy, and in 30 patients the condition of the lungs was observed at operation.

Striking engorgement of the pleurohilar veins was noted in all the cases in which these veins were exposed by dissection.

The possible function of the pleurohilar veins as a decompressive mechanism in patients with pulmonary venous hypertension is discussed, and the effects of this mechanism on the symptoms of mitral stenosis are considered. JOHN J. MALONEY, M.D.

Pulmonary Circulatory Dynamics in Mitral Stenosis Before and After Commissurotomy. LARS WERKÖ, GUNNAR BIÖRCK, CLARENCE CRAFOORD, HELGE WULFF, HANS KROOK, and HARALD ELIASCH. *Am. Heart J.*, 1953, 45: 477.

A study has been made of pulmonary artery dynamics before and after commissurotomy in patients with mitral stenosis. The following were recorded: pulmonary capillary and artery pressures, the cardiac output (by the Fick principle), the brachial artery pressure, the electrocardiogram and phonocardiograms.

In evaluating the data the observer must recognize the sources of error in techniques. The Fick method of measuring the cardiac output requires simultaneous sampling of the right heart and systemic artery blood, and expired air from a patient in a steady state. At least 7 minutes of exercise are required to achieve a steady state of exercise in patients with mitral stenosis. Pulmonary vascular pressures between the capillary and artery sites should be measured without interval and close to the times of output determinations.

Although it is recognized that both pressure and flow determinations must be used to evaluate the degree of stenosis, inasmuch as small changes in flow may alter pressures markedly, the formula proposed by Gorlin and Gorlin to calculate the size of the mitral orifice from that data incorporates too many variables to render it valid. Instead, calculations of total pulmonary resistance, pulmonary vascular resistance, and mitral valvular resistance are made from data obtained:

1. Pulmonary vascular resistance = $\dfrac{(\text{pulmonary artery mean} - \text{pulmonary capillary venous mean})\ K}{\text{cardiac output per second.}}$
2. Total pulmonary resistance = $\dfrac{\text{P.A. mean } K}{\text{C.O./sec.}}$
3. Mitral valvular resistance = PVR − TPR in dynes/sec./cm.$^{-5}$

These data indicate whether pressure increase in the pulmonary artery is due to mitral stenosis or to pulmonary vascular changes.

Between 32 and 39 patients who survived operation were studied before operation and 2 months after. Seven other patients died as a result of surgery. The operative techniques of Bailey and of Baker were employed.

The data permit division into three groups. A group of 10 patients with marked changes in resting

dynamics included 6 who died, but the 4 survivors were greatly benefited. Of 16 patients with more moderate changes, 1 patient died, 12 patients were improved, and 3 were not objectively better. Of 13 patients with little change in dynamics before surgery only 5 were definitely benefited. The responses to exercise in many cases were correlative with rest changes produced by commissurotomy. In a few cases the exercise improvement was a little better than that noted in rest data. However, in no case was there a complete return of pulmonary dynamics to normal following operation. Even in the most successful cases there remained some pathologic reaction to exercise.

An attempt is made to relate these findings to an ordinary clinical examination of patients in order to select the middle group of patients with not too advanced diseases, in which the chances for improvement are good and the risks of surgery are low.

Of 14 patients with auricular fibrillation, 5 died and 4 showed no objective improvement. Three-fourths of 25 patients with sinus rhythm were benefited. No patient older than 45 years was benefited. All patients who died were older than 35 years. Six of the 7 patients who died had heart enlargement over 600 ml./m² B.S.A., as measured by the formula of Liljestrand, and shown by roentgenography.

Therefore, the best improvement in cardiopulmonary dynamics was obtained in those patients who were younger than 45 years, had sinus rhythm, with no greatly enlarged hearts, and whose symptoms corresponded to those of groups III or IV of the New York Heart Association scale.

On the other hand, the absence of abnormal dynamics at rest in many patients with mitral stenosis, the failure to produce any improvement in exercise dynamics in more than half of that group, the increase of vascular changes due to postoperative complications in some cases, and the uncertainty of duration of whatever improvement is obtained, are all good reasons for not recommending the operation as a prophylactic measure in the early phase of the disease.

LEONARD D. ROSENMAN, M.D.

The Surgical Treatment of Mitral Stenosis by Commissurotomy: Report of 50 Cases. DENTON A. COOLEY, MICHAEL E. DE BAKEY, and DON W. CHAPMAN. *Am. Surgeon*, 1953, 19: 165.

The authors report their experience with the first 50 consecutive patients who have undergone mitral commissurotomy at Baylor University College of Medicine.

Details of preoperative preparation, operative technique, and postoperative care are given.

There were 4 deaths, 3 of which were operative fatalities. Three patients died of peripheral embolism and 1 patient from progressive heart failure. Results were considered good in 74 per cent of the survivors, fair in 19 per cent, and poor in 7 per cent.

More than 40 per cent of the patients in this series were considered to be class 4, and 90 per cent were in either class 3 or 4. Operation seems to be justified in these patients who are otherwise destined to chronic invalidism or premature death.

The most satisfactory results were obtained in patients between the ages of 25 and 35 years. Peripheral embolism occurred before operation in 11 patients and in only 1 of these did embolization occur subsequent to valvulotomy. It appears that peripheral embolism in the presence of mitral stenosis is actually an indication for valvulotomy and offers lasting protection against embolization.

Before operation 24 patients had auricular fibrillation. Of these, 15 patients obtained good results and there were 3 deaths. While auricular fibrillation is not a contraindication to valvulotomy, it increases operative risk and slightly diminishes the possibility of a good functional result.

In the presence of valvular calcification, the commissural incision should be made gradually in order to control the degree of mitral insufficiency. A relatively small degree of mitral insufficiency does not contraindicate commissurotomy. Good functional results were obtained in 2 patients who were pregnant. The optimum time of operation is before the fifth month of pregnancy. Recurrence of mitral stenosis after commissurotomy has not occurred.

S. LLOYD TEITELMAN, M.D.

Hydatid Cyst of the Heart Localized in the Left Ventricle; Operation; Cure (Quiste hidático del corazón localizado en el ventrículo izquierdo; operación; curación). LUIS M. BOSCH DEL MARCO, EDUARDO JOAQUÍN CANABAL, JORGE DIGHIERO, JOSÉ M. BALDOMIR, and Others. *Bol. Soc. cir. Uruguay*, 1951, 22: 576.

The authors present a case of hydatid cyst of the left ventricle of the heart, the first successful surgically treated case to be presented in the world medical literature. The case in question was one of hydatidosis of the left ventricle of tumoral type, not complicated, with well defined forms radiologically, tomographically, electrocardiographically, and angiocardiographically. In cases of the complicated tumoral type, the exact location of the primary ventricular cyst cannot be made by these means. The authors are of the opinion that cardiac hydatidosis occurs more frequently than it would seem, and they emphasize the importance of studying each patient suspected of having cardiac hydatidosis. Roentgenograms, and, above all, angiocardiograms and electrocardiograms are the principal means of diagnosing this important type of cardiac hydatidosis.

The preoperative electrocardiogram shows the presence of deeply inverted T waves, clearly coronary in appearance in the precordial leads; in addition, there is a definite reduction in the height of the R waves in the 2, 3, 4 and 5 positions of the CV precordial lead.

The electrographic study suggests the existence of a myocardial ischemia in the anterolateral region of the left ventricle. The angiocardiogram was made

with 75 per cent neo-iopaz, successive plates being taken at intervals of a second; a clear amputation of the lower external region of the internal border of the left ventricle was clearly evident.

After general anesthesia with cyclopropane and ether and local anesthesia with ½ per cent novocaine in physiological solution, resection of the fifth rib was carried out and the pleura was opened. There were no adhesions whatsoever, and a tumor was found on the heart, in front of and above the apex, standing out across the pericardium. The pericardium was opened.

The tumoral mass on the left ventricular wall was punctured without positive effect and on removal of the trocar after a second puncture, a viscous chocolate-colored liquid flowed from the orifice. An incision was made in the tumor with the point of a bistoury, exposing the remainder of an old hydatic membrane and a caseous magma, the rest of which was removed from the cavity with a heart forceps and repeated maneuvering. The cavity was examined with a fine speculum.

Before the cavity was closed, an electrode was placed at the bottom to obtain an electrocardiographic record for comparison with the preoperative records. The electrocardiogram showed that the alteration picked up preoperatively was due to this tumoral mass. After the injection of 400,000 units of penicillin into the cavity, closure of the myocardial opening and of the pericardium was carried out. Two tubes for drainage were placed in the anterior and posterior pleural sac, and the thorax and skin were closed. The hydatic cyst was localized on the left ventricular wall on top and in front of the cardiac apex. The operation was well tolerated and the postoperative period was uneventful.

M. López Belio, M.D.

Results of the Blalock-Taussig Operation in 200 Cases of Morbus Caeruleus. Maurice Campbell and D. Deuchar. *Brit. M. J.*, 1953, 1: 349.

Congenital cyanotic heart disease (200 cases) is evaluated following subclavian to pulmonary artery anastomosis. Following this procedure the collateral circulation developed well in the arm without complications. Results based on the degree of cyanosis, clubbing of the fingers, the site of anastomotic murmur, blood pressure, exercise tolerance, hemoglobin, and x-ray estimations are classified as follows:

Group	Results of Operation	Number of patients
1	Very good	99
2	Good	37
3	Some improvement	17
4	Good or improved: death later	6
5	No improvement	6
6	No anastomosis possible	11
7	Death at or shortly after operation	24

The follow-up periods were: 4 years for 28 patients, 3 years for 37 patients, 2 years for 42 patients, 1 year for 53 patients, and less than 1 year for 5 patients.

Following successful operations, 6 (3.8%) of the patients died during the follow-up period, but 2 of these deaths were from unrelated causes. Of the patients with the tetralogy of Fallot, 8 per cent died following surgery and 75 per cent were benefited greatly. Among the patients with more complex lesions the mortality was 30 per cent and good results were obtained in 35 per cent.

The results in cases of tricuspid atresia were as good as those in cases of the tetralogy of Fallot. Dextrocardia and isolated levocardia resulted in a 50 per cent mortality, but very good results may be obtained in a few cases. The results of operation in pulmonary atresia might indicate that the operation was unsuitable except for 2 or 3 cases in which good results were obtained.

The hemoglobin values frequently fell from between 120 and 160 per cent to between 90 and 120 per cent following successful operations, but this fall did not always take place. The cardiothoracic ratio rises an average of 3 per cent following surgery. There is a small group in whom (1) the heart size shows no change, (2) the heart size increases at first but subsequently gets smaller, and (3) the heart increases in size progressively. In general, the outlook is better when the heart is smaller, although a ratio of 55 per cent or above may be accompanied by a good result. Robert L. Craig, M.D.

Pedunculated Thrombus of the Left Auricle Causing Death During Aortic Embolectomy. Stanley H. Gumbiner and John L. Keeley. *Angiology*, 1953, 4: 114.

The actual cause of death during the course of an embolectomy may be obscure, but it is probably due, in many instances, to cardiac embarrassment brought about by the additional burden of anesthesia and operative shock. There has been an increasing number of successful aortic embolectomies in recent years. No case of death during embolectomy as a result of a ball valve or pedunculated thrombus of the left auricle or auricular appendage has been encountered in the literature.

The authors describe an embolectomy for a saddle thrombus of the aorta. The embolus occurred during the course of auricular fibrillation in a patient with rheumatic heart disease and mitral stenosis. After the embolus had been removed, but before closure of the abdomen, there was a rapid onset of cardiorespiratory failure and sudden death due to a pedunculated thrombus of the left auricle.

Robert A. Nabatoff, M.D.

Cardiac Metastases from Malignant Tumors. Pentti I. Halonen and Alvari Aho. *Ann. med. Int. fenn.*, 1953, 42: 11.

In a series of 7,150 autopsies collected from the Department of Pathological Anatomy of the University of Helsinki and the Pathological Department of the Kivela Hospital, Helsinki, Finland, between 1923 and 1951, a total of 946 malignant tumors were observed. In 50 of these cases, or 5.3

per cent, a secondary neoplasm was found in the heart or pericardium. The incidence was highest in association with malignant melanomas, thyroid carcinomas, lymphoblastomas, and pulmonary carcinomas. The right side of the heart was more often involved than the left. The secondary tumor was localized less frequently in the endocardium than in other layers of the heart. The tumor apparently reached the heart in most instances by way of the blood or lymph streams. Occasionally direct extension accounted for its presence in the heart or pericardium. The cardiac metastases were usually solid and rarely diffused. In only 1 case a secondary tumor of the heart had been clinically considered as a possibility.

The most common symptom seen in association with secondary cardiac tumors was the development of congestive heart failure, which occurred in 16 cases. This condition did not appear to be related to the size or localization of the cardiac metastases. Constant tachycardia was present in 5 of the cases under consideration. In association with pericardial metastases a hemopericardium was present in 5 of a total of 14 cases in which the pericardium was involved. A pericarditis with effusion was present in 3 cases, and cardiac constriction was seen in an additional case. When the metastatic neoplasm was situated in the right heart, which occurred in 18 cases, the symptoms were those of obstruction to the inferior vena cava, which occurred once, and progressive pulmonic stenosis, which occurred once. In involvement of the left heart (12 cases), the most common manifestation was peripheral tumor embolization which was demonstrated in 5 instances. In 1 case there was evidence of obstruction to the right side of the heart by an extensive neoplasm growing into the right auricle. Nodal extra systoles occurred in association with metastases in the septum. In cases of diffusely spread tumor metastases in the myocardium no clinical symptoms were definitely recognized.

Two brief case histories of tumor metastases to the heart are given. HIRAM T. LANGSTON, M.D.

ESOPHAGUS AND MEDIASTINUM

Spontaneous Perforation of the Esophagus. J. Y. W. RUSSELL. *Brit. J. Surg.*, 1953, 40: 312.

In 1724, Boerhaave, the famous Dutch teacher, first described the condition of spontaneous rupture of the esophagus. Most of the 60 cases reported in the literature were recognized at postmortem examination, only 16 being diagnosed during life. Recently early operation has been advocated, and a few recoveries are recorded.

A 35 year old woman became ill the evening before admission to the hospital, complaining of sudden nausea, vomiting, and a lump in her throat. A second episode of vomiting produced bright red blood and the lump in her throat disappeared. Five hours after onset, swelling of neck, face, and eyes began and progressive weakness was noted. Previously, the patient had complained of difficulty in swallowing since the age of 17.

Physical examination disclosed subcutaneous emphysema of the face, neck, and upper chest. The chest examination and roentgenogram of the chest were negative. A lateral roentgenogram of the neck demonstrated retropharyngeal emphysema.

A diagnosis of spontaneous perforation of the esophagus was made and the cervical esophagus was explored. There was a defect in the anterolateral aspect of the esophagus just before its commencement. The defect was oval and measured approximately 2 by 1 cm. The defect in the mucosa was small. Convalescence was rapid following simple closure of the defect. A postoperative barium swallow demonstrated no abnormalities.

This condition commonly occurs in middle-aged men with a tendency toward obesity or over-indulgence in alcohol. Vomiting or retching appears to be a precipitating factor in most cases. Usually a localized pathologic condition may be found, but not invariably. In 1884, McKenzie experimentally concluded as follows:

1. Rupture of the esophagus by direct pressure from within always takes place longitudinally.
2. The rupture never occurs in the upper part.
3. The mucous membrane appears to offer greater resistance to strain than the muscularis.

McKenzie's conclusions agree very well with the pathologic physiology noted. Usually, the rupture occurs at the lower end of the esophagus, just above the diaphragm on the left side, and it is longitudinal. Widespread mediastinal emphysema and areas of necrosis result from the perforation. This may be localized to the mediastinum; however, rupture into the left pleural cavity is more common; it produces a chemical pleuritis and subsequently empyema.

The clinical picture is ushered in by nausea and vomiting, with acute pain behind the sternum or in the upper abdomen, followed by collapse, rigidity in the upper abdomen, and breathlessness. Signs of pleural effusion or subcutaneous emphysema may be present. One must differentiate this condition from a ruptured duodenal ulcer, acute pancreatitis, myocardial infarction, dissecting aneurysm, and spontaneous tension pneumothorax. X-ray examination of the chest is of great value in the diagnosis. Treatment should consist of early exploration of the esophagus with suture of the defect.

The case reported appears to be the first one reported in which the rupture occurred in the cervical esophagus. JERRY A. STIRMAN, M.D.

Spontaneous Rupture of the Esophagus (Rupture spontanée de l'oesophage). G. CERBONNET and CL. COUINAUD. *J. Chir.*, Par., 1953, 69: 210.

The term "spontaneous rupture" of the esophagus does not include perforation caused by foreign bodies, endoscopic maneuvers, peptic ulcer, and benign or malignant tumors, and is applied only to a tear of macroscopically normal wall of the thoracic portion of the esophagus, usually following vomiting.

As a rule, the rupture is longitudinal and involves all layers of the esophageal wall. In 1 case observed by the authors the tear was on the right side and in the other case there was a rupture on either side of the esophagus. The lower end of the tear is nearly always located just above the passage of the esophagus through the diaphragm. Acute mediastinitis rapidly follows rupture of the esophagus, while later the pleura also becomes involved.

Although the mechanical effect of vomiting undoubtedly is an important factor, the pathogenesis of spontaneous rupture of the esophagus remains obscure. The accident occurs most frequently in men over 35 years of age. Excruciating pain dominates the clinical picture and is followed by anxiety, polypnea, acceleration of the pulse, hypotension, rigidity, and pain in the epigastrium. In contradistinction to signs of a perforated gastric ulcer, the rigidity is not boardlike and the area of liver dullness is not increased. Cyanosis, dyspnea, and emphysema direct attention to the esophagus. Mediastinal emphysema and pleural effusion are recognizable roentgenologically.

If untreated, the condition is fatal within a period ranging from 6 hours to 6 days.

The treatment is surgical and consists of suturing the lacerated esophagus, débridement of the mediastinum, and evacuation of the pleural effusion. As the rupture lies more frequently on the left side than on the right, thoracotomy through the bed of the left seventh or eighth rib is the method of choice.

The authors collected from the literature 51 reports of spontaneous rupture of the esophagus and they report 2 observations of their own.

JOSEPH K. NARAT, M.D.

Carcinosarcoma of the Esophagus. J. ROBERT THOMPSON. *J. Thorac. Surg.*, 1953, 25: 261.

In a patient dying of tuberculosis at the age of 61, a neoplasm composed of more than one cellular component was found in the esophagus at autopsy. Upon opening the esophagus a firm, pedunculated, smooth, yellow-gray, kidney-shaped tumor measuring 5.0 by 2.5 by 1.5 cm. was encountered.

Histologically, the most striking feature was the sarcomatous nature of the stroma which displayed many huge bizarre giant cells and appeared to be actively proliferating. In addition, there were present nests of undifferentiated epithelial cells which in some areas showed a tendency toward rosette formation. The consensus of opinion of several consultants was that this tumor represented a carcinosarcoma.

Hansemann, in 1904, expressed the opinion that the term carcinoma sarcomatoides should be reserved for the description of a carcinoma with a sarcomatous stroma, and Herxheimer, in 1908, confirmed the finding of flat epithelial masses within or surrounded by a sarcomatous stroma.

The interesting features worthy of mention in this case are: (1) no evidence of metastases could be demonstrated and no invasion of the mucosa occurred; (2) this man had two primary tumors, carcinosarcoma of the esophagus and an epidermoid carcinoma of the buccal mucosa (the multicentric origin of tumors is well known, and certainly from a histologic and an anatomic standpoint there is no connection between these two neoplasms); (3) this growth was an incidental finding at autopsy, there being no clinical symptomatology or x-ray evidence of the neoplasm prior to death. The man was critically ill from pulmonary tuberculosis and it is quite possible that this masked any symptoms of the lesion which occurs quite commonly in such instances.

Another feature of this case was the presence of several early tubercles about the periphery of the tumor. Normal esophageal mucosa is rarely, if ever, involved in a tuberculous inflammatory process.

J. H. MOHARDT, M.D.

Experimental Study of Esophagoplasty with Vascular Homografts and Heterografts (Etude experimentale des plasties oesophagiennes par homogreffes et heterogreffes vasculaires). G. ROUX, E. NEGRE, R. LOUBATIERES, G. MARTIN, and J. DU CAILAR. *J. internat. chir., Brux.*, 1953, 13: 34.

The purpose of the first series of the authors' experiments was the re-establishment of continuity of the intestines in goats and dogs after resection of a segment of the gut. Segments of the aorta preserved in a refrigerator in Hanks' solution were anastomosed end to end with the intestines. As a rule, the grafts took and the wall of the transplanted segments became lined with epithelium of the intestinal type.

After the experiments had demonstrated the feasibility of this method, similar plastic procedures were employed in dogs after segmental resection of the esophagus. Either a dog's aorta or a calf's vena cava was used for the re-establishment of continuity of the esophagus. Gradually, malpighian epithelium lined the lumen of the transplanted material.

A stenosis developed in nearly every instance, but it was not of irreversible character. When epithelization was completed, the graft lost its inflammatory character and the original striation reappeared.

JOSEPH K. NARAT, M.D.

The Mediastinal Hernia and Its Relation to Thoracic Surgery (Die Mediastinalhernie in ihrer Bedeutung fuer die Thoraxchirurgie). A. BRUNNER. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1953, 273: 513.

The mediastinal hernia is an abnormal shifting of the mediastinal sac due to a difference in pressure between the pleural cavities. A predisposing factor of this type of hernia is the presence of two anatomically weak spots in the otherwise strong and elastic connective fibers of the mediastinum. Patients with a pneumothorax often have a mediastinal hernia due to overexpansion of a lung. As long as no respiratory difficulties appear, this is considered only as a side reaction with a high pressure in the pneumothorax. Complete atelectasis can also cause severe spontane-

ous shifting of the mediastinum. If a tumor or a tuberculous lesion of a bronchus causes this atelectasis, further diagnostic studies are indicated.

After lung resection, the appearance of a mediastinal hernia indicates an unfavorable overexpansion of the healthy lung. It should facilitate the decision to do a secondary thoracoplasty in order to prevent respiratory embarrassment for the patient. In cases of excessive exudation following surgery, closed drainage will help to restore the lung to better function. Overexpansion of the healthy lung should be watched for carefully because when the lung is out of its boundaries, an unintentional puncture could easily occur and a fatal outcome would be probable if the condition were not recognized immediately. One case of overexpansion of the healthy lung was successfully treated by the resection of ten ribs, which not only corrected the overexpansion of the lung, but also greatly benefited the condition of mediastinal hernia.

A mediastinal hernia should always be considered a serious condition, especially after thoracic surgery, when it should be recognized immediately and treated promptly to prevent heart failure and respiratory embarrassment in the patient.

M. López Belio, M.D.

Mediastinal Lipoma: The Successful Removal of a 1,700 Gram Mass. John H. Keeley, Stanley H. Gumbiner, Anthony C. Guzauskus, and James A. Rooney. *J. Thorac. Surg.*, 1953, 25: 316.

The authors present a case report dealing with the removal of an 1,700 gm. lipoma from the mediastinum of a 28 year old female, with a review of the recent literature of intrathoracic lipomas.

The classification of intrathoracic lipomas as presented by Heuer included three groups: the hourglass form in which the intrathoracic part is connected with the extrathoracic part by an isthmus passing through the chest wall; a second group, the superior mediastinal type in which part of the tumor presents in the base of the neck and is connected with the intrathoracic or mediastinal portion by an isthmus; and the third group, in which the tumor lies entirely within the thorax. Fulde classified the intrathoracic lipomas in two groups: those which were entirely intrathoracic and those which had both intrathoracic and extrathoracic portions.

The authors suggest the following classification: (1) intrathoracic lipomas, those lying entirely within the thoracic cage; (2) hourglass thoracic lipomas, those having both intrathoracic and extrathoracic positions—(a) cervicomediastinal, passing from the mediastinum into the neck and (b) transmural, passing through the chest wall, usually an intercostal space but rarely through the sternum.

Of the 57 cases reported in the literature, 41 were entirely intrathoracic lipomas. Sixteen were in the hourglass group; 6 of these were cervicomediastinal and 10 were transmural; all of them projected through an intercostal space except one which passed through the sternum.

Three intrathoracic lipomas were found in children less than 6 months of age, which suggested a congenital origin. The lipomas entirely within the chest, 41 in number, comprised the largest group. They varied in size from that of a walnut to a 17.5 pound tumor reported by Leopold.

The slow growth and soft consistency of lipomas make it possible for some of these tumors to attain a large size without causing alarming symptoms. The symptoms, then, depend on their size and location and often are exertional dyspnea, a feeling of heaviness and oppression in the chest, and cough due to tracheal pressure or irritation of the pleura. The physical signs are dullness and suppression of the breath sounds in accord with the size of the tumor.

Fluoroscopy, roentgenograms, aspiration, bronchograms, bronchoscopy, and pleuroscopy have been used diagnostically. Aspiration has been done many times because the lesion closely simulated a pericardial collection of fluid. An oily fluid may be aspirated.

The diagnosis of a benign lesion has been made in most instances because of the good general clinical condition of the patient when considered in relation to the size and location of the intrathoracic lesion. The correct diagnosis of lipoma has been made only six times prior to operation and was based on the results of aspiration of fat in 4 cases. The correct diagnosis has been made at operation in 38 cases and 30 tumors have been removed successfully.

This case report brings the total number of reported cases of intrathoracic lipoma to 58. It is suggested that intrathoracic lipomas be classified in two groups: those that are entirely intrathoracic, and those that have intrathoracic and extrathoracic portions. A résumé of the literature concerning intrathoracic lipomas during the past 10 years has been made to supplement previous views, and another case in which a 1,700 gm. mediastinal lipoma has been removed successfully is added.

John H. Mohardt, M.D.

MISCELLANEOUS

The Blood Eosinophil Count in the Evaluation of Indications for Surgical Operations on the Lungs. P. E. A. Nylander, A. Pekkarinen, L. E. Aro, and Martti Turunen. *Ann. chir. gyn. fenn.*, 1953, 42: 7.

The authors have attempted to evaluate the pituitary-adrenal response to the stress of operation in 34 patients. Fourteen of the patients had chronic pulmonary suppuration and 20 had pulmonary carcinoma.

Preoperatively, the eosinophil response to the subcutaneous injection of 0.3 mgm. of epinephrine (Thorn test) was carried out on all patients. Of the entire series, 11 patients showed an abnormal response to the subcutaneous injection of epinephrine, that is, a decrease in the eosinophil count of less than 40 per cent of the preinjection level. In 6 of these patients, the eosinophil response was slight, but in

all 6 it responded to an intramuscular injection of 25 mgm. of ACTH. Five of the 11 patients had inoperable carcinoma of the lung. Of the 11 patients who failed to respond to the Thorn test, the remaining 6 had chronic pulmonary suppuration. In all 6 of these patients pneumonectomy was performed; 2 died, 3 recovered slowly, and 1 patient had an uneventful recovery. The 23 patients who had a normal response to the epinephrine test made completely uneventful recoveries after surgical treatment. All of the patients who had had operations showed a decrease in the eosinophil count of at least 94 per cent on the first postoperative day. In all, the eosinophil count had returned to normal by the seventh day. Repeat counts on the fourteenth and twenty-first days after operation showed the eosinophil counts to be normal or slightly above normal.

The authors conclude that although the epinephrine and ACTH tests are not absolute criteria for the estimation of adrenal function, they should be used in the evaluation of patients who are considered to be operative risks, and that the failure of the 6 patients who had chronic pulmonary suppuration to respond to these tests is significant.

JOHN H. DAVIS, M.D.

Pericardial Diverticula. PENTTI I. HALONEN and HEINO LAITINEN. *Ann. chir. gyn. fenn.*, 1953, 42: 23.

Pericardial diverticula are outpouchings of the parietal pericardium which are either congenital or acquired. Congenital diverticula are caused by a weak spot in the pericardium which bulges at sometime in later life when intrapericardial pressure rises. The acquired diverticula may be divided into two types, pulsion diverticula and traction diverticula; the former are usually caused by a weakening in the parietal pericardium which has been damaged by inflammation of the heart. The latter type originates from adhesion to a surrounding structure which draws the pericardium into a funnel and finally enlarges it into a diverticulum.

True diverticula must be differentiated from loculated pericardial effusions and true pericardial cysts of congenital origin. Both loculated pericardial effusions and congenital pericardial cysts grow independently of the pericardium and may become so enlarged that they cause clinical symptoms.

The authors report a case involving a Scandinavian laborer, 20 years of age. A routine roentgenogram of his chest taken in the military service revealed a sharply limited shadow to the left of the heart and adjoining it. The patient was asymptomatic except for a slight pressure in the chest when he bowed. The only other positive findings in this case were a change in the shape and the size of the mass during the phases of inspiration and aspiration. Because a pericardial tumor could not be ruled out, it was decided to do an exploratory thoracotomy. At the time of exploration a thin-walled cystlike tumor, connected with the pericardial cavity by means of a narrow neck, was visible on the front surface of the left ventricle. Fluid was seen to enter the diverticulum during diastole and to leave during systole. The diverticulum was removed, the hole in the pericardium was closed, and the patient had an uneventful postoperative course.

The diverticulum removed in this case had some of the signs of a congenital diverticulum and also some signs of an acquired diverticulum. The patient had two prolonged febrile episodes some years prior to the present operation, the cause of which was unknown. Because of the mixed findings in this case, the origin of the diverticulum remains obscure.

The prognosis of pericardial diverticula is good. They are seldom harmful and in most instances surgical treatment is not indicated; however, any intrathoracic tumor which cannot be proved to be benign should be removed. JOHN H. DAVIS, M.D.

SURGERY OF THE ABDOMEN

GASTROINTESTINAL TRACT

Effects of Cortisone and of Adrenalectomy on the Secretion of Gastric Acid and on the Occurrence of Gastric Ulceration in the Pylorus-Ligated Rat. RICHARD B. WELBOURN and CHARLES F. CODE. *Gastroenterology*, 1953, 23: 356.

The authors report the results of their investigation of the effects of cortisone and of adrenalectomy on the secretion of gastric acid and on the occurrence of gastric ulceration in the pylorus-ligated rat.

Cortisone acetate given in varying dosage intramuscularly caused a slight but definite decrease in the secretion of acid. Adrenalectomy performed 2 to 3 weeks previously caused a decrease in the secretion of acid which was restored to normal by 20 mgm. of cortisone acetate given daily for 3 days. The incidence of gastric ulceration in the forestomach was not influenced by either cortisone acetate or adrenalectomy. DONALD C. GEIST, M.D.

The Problem of Peptic Ulceration. SIR HENEAGE OGILVIE. *Lancet*, Lond., 1953, 244: 555.

This presentation, based on a lecture to the Leeds Medical Society, is a rather general discussion of the problem of peptic ulceration.

The role of hydrochloric acid (the dangerous fluid) in the causation of peptic ulcer is thoroughly discussed. Its action on the gastric wall in the production of peptic ulcer is possible only when there is a break or fault in the mucous membrane surface and when the quantity of acid secreted is in excess of the amount needed for the digestion of food.

Injury of the mucosa may arise from numerous causes. The author describes a so-called "ulcer belt" in the southeastern seaboard of India. The most probable cause is the use of red pepper in the seasoning of the food. Strong condiments, hot drinks, drugs, and the like may produce mucosal injury. The relative fixation of the lesser curvature of the stomach and the first portion of the duodenum with thin mucosa and little submucous tissue is also a factor in the production of such injury.

Peptic ulceration as a problem of major importance is relatively new. The increase in numbers of cases has been great so that it is estimated that 10 per cent of the adult population in Britain suffers from the disease. This is believed to result largely from the stress of modern times with evidence of excessive overaction of the autonomic nervous system and the hormonic systems in the production of acid.

Three factors can therefore be accepted as being related to the etiology of ulcer: (1) local injury to the gastric mucosa by swallowed irritants, (2) secretion of acid at an abnormally high level, and (3) secretion of acid when it is not wanted for the digestion of food.

Diagnosis is usually a straightforward matter. The atypical case offers the most difficulty. Peptic ulceration should be suspected in all cases of unusual loss of weight, in patients in whom symptoms occur at regular periods of the day, and in patients in whom there is a tendency toward symptoms to be associated with periods of stress and strain. When an ulcer penetrates another organ, the pain is that of the organ involved and may have no relation to meals.

Medical treatment comes first and may cure many ulcers. When it fails, surgical therapy becomes necessary. Long-term follow-up may reveal a gradual decrease in the good effects of medical management.

The indications of surgical care assume different values in gastric and duodenal ulcers. It is a safe rule that a gastric ulcer not healed after a year of good, well followed medical treatment should be operated upon. If there is any doubt of its innocence, it should be treated surgically at an earlier date. Malignancy in an ulcer is suggested by onset of the ulcer after the age of 45 or more, when the ulcer is situated in the prepyloric inch or more or on the anterior surface of the greater curvature, when the ulcer has a diameter of an inch or more, and by the presence of anorexia or achlorhydria. Duodenal ulcers are a very different matter, operation being aimed at the complications of the ulcer. Three indications are absolute: perforation, stenosis, and hemorrhage of 2 pints or more in a man more than 50 years of age. Failure of medical treatment is another indication for surgery, but the decision as to exactly when the latter should be used is difficult. The author uses as a working guide the rule of 10 and the rule of 40. If the patient has lost either 10 per cent of his working time or 10 per cent of his weight in the previous 12 months, surgery is advised. If a man has reached 40 years of age and still has pain in spite of adherence to careful diet and alkalies, he should be advised that surgical therapy is needed.

The operation should be gastrectomy. The mortality should be negligible (under 1%) and the cure rate should be at least 90 per cent. Successful gastrectomy should fulfill two criteria. The stomach should hold a reasonable-sized meal and retain it long enough for gastric digestion. Second, it should secrete some hydrochloric acid in a concentration low enough to be safe and only at such times as it contains food. To attain this ideal, five technical requirements are needed:

1. The whole pyloric mucous membrane must be removed.
2. The body of the stomach containing the most thickly studded gastric glands must be removed.
3. The perigastric tissues on the lesser curve must be divided at the level of the cardia.
4. The size of the stoma must be no larger than the diameter of the small intestine into which it empties.

5. The passage of food after leaving the stomach must be in an onward direction only.

The causes of failure of gastrectomy are several and the author admits that these vary with varying surgeons and their opinions. He believes that it is important not to remove too much stomach. Antecolic anastomoses and the Polya procedure are not recommended by the author.

He believes further experimentation with careful evaluation of all work done is necessary.

DONALD C. GEIST, M.D.

Gastric and Duodenal Tissue Alkaline Phosphatase in Peptic Ulceration. JOHN H. FODDEN. *Gastroenterology*, 1953, 23: 372.

Gastrectomy specimens were collected and especially treated for the studies reported in this article. Intestinal metaplasia, petechial hemorrhage, erosion, acute and subacute ulcer, and chronic ulcer have all been studied individually. The presence and behavior of enzymes and metabolites within cells or cell groups have been investigated. A wide knowledge of normal conditions and those produced by diseases is necessary.

The localization of alkaline phosphatase within the gastric and duodenal walls in human peptic ulceration was studied and described. Its presence in many parts of the tissues of these organs in animals and man was described as normal, which statement has been confirmed by several investigators. Enzymes have been identified within and around foci of recent intramucosal hemorrhage and erosion has been described. It has been observed in large quantities and widely distributed in chronic ulceration. The healing and repair of gastroduodenal ulceration have been reported.

RICHARD J. BENNETT, M.D.

Gastroduodenal Ulcer in the Child (Sull'ulcera gastro-duodenale nel bambino). A. SETTIMI. *Fracastoro*, 1952, 45: 331.

There is considerable difficulty in obtaining a satisfactory history from children. In the majority of cases the diagnosis of gastroduodenal ulcer in a child is made accidentally by roentgenography.

The author presents 2 cases of peptic ulcer in children. The first one was that of a 9 year old child who experienced bitter eructation approximately 18 months prior to admission and had associated epigastric pain which later became periumbilical in distribution. He later experienced vomiting every 2 or 3 days. A tentative diagnosis of pyloric stenosis was made. X-ray examination revealed gross deformity of the duodenal bulb. A diagnosis of pyloric stenosis secondary to ulceration was made. Exploratory laparotomy and gastric resection with gastrojejunostomy posterior to the transverse mesocolon were carried out. The patient had an uneventful postoperative course and up to the time that the case was reported had had no difficulty.

The second case was that of a 10 year old child who experienced pain in the epigastric region approximately 8 months prior to admission. He had had a feeling of nausea and at times a diffuse pain over the entire abdomen localizing to the right lower quadrant. Later the pain developed along the typical pain-food-relief pattern. There was no evidence of hematemesis in this case or in the preceding one. X-ray examination revealed deformity with nicking of the duodenal bulb. The patient was managed medically with excellent results and discharged without symptoms.

After an extensive review of the literature, the author thinks that stenosis, hemorrhage, and perforation are the three most common complications in children. Stenosis appears to be the most frequent one and is reported in as high as one-third of the cases. Hemorrhage occurs, as reported by various authors, in from 7.03 to 50 per cent. Perforation is frequently diagnosed preoperatively as "ruptured appendicitis" and various authors report this incidence to be as high as from 25 to 61 per cent. Surgical treatment is indicated, of course, in the failure of medical management. The surgeon has three methods of treatment at his disposal. He can suture the perforation, do a pyloroplasty, or do a gastric resection. Each method has its advocates and each its indications. Medical management is given a fair trial and if this is unsuccessful, surgical intervention is indicated. FRANK W. PIRRUCCELLO, M.D.

Bleeding Gastric Ulcer Requiring Partial Gastrectomy in a Patient Receiving Cortisone. GEORGE A. HIGGINS and RICHARD D. RIDER. *Am. Surgeon*, 1953, 19: 275.

A 61 year old white gardener was admitted to the hospital for treatment of a severe exfoliative dermatitis and pustular psoriasis. There was a history of perforated duodenal ulcer 1½ years previously. Nine months after the beginning of ACTH and cortisone therapy, the patient began to bleed profusely from the upper gastrointestinal tract. After 4 days of conservative treatment, consisting of whole blood replacement for repeated episodes of hematemesis, subtotal gastrectomy was performed. There was an acute gastric ulcer (3 cm.) on the lesser curvature. The duodenum was scarred but no acute ulceration was present. Convalescence was satisfactory.

This case demonstrates the need for discretion in administering ACTH or cortisone to patients with an ulcer diasthesis, especially without concurrent treatment to guard against an acutely developing ulcer. This case also tends to support the conclusion that one may operate on patients receiving these drugs without fear of their ability to withstand surgery or to heal wounds.

JERRY A. STIRMAN, M.D.

The Management of Bleeding from the Upper Gastrointestinal Tract. STANLEY O. HOERR. *N. England J. M.*, 1953, 248: 404.

The problem of bleeding from the upper gastrointestinal tract is discussed with emphasis upon the

clinical approach, in fact, without mentioning any of the more complicated laboratory procedures.

Diagnosis of the source of hemorrhage, on the assumption that the gums, nose, and respiratory tract are ruled out, is aided by the fact that 75 per cent of such hemorrhages are from peptic ulcer, with gastritis and esophageal varices accounting for the bulk of the remainder. If hemorrhage is slow, appraisal may be more deliberate. If the source of the hemorrhage is previously known, the appraisal may be quick and definitive treatment started immediately. The patient bleeding rapidly from an unknown lesion poses the greatest problem.

The presence of rapid bleeding can be appraised without elaborate laboratory methods by observing the signs and symptoms of peripheral vascular collapse. Frequent check of the blood pressure and pulse will help determine the presence of continuing hemorrhage as uncompensated hemorrhage is accompanied by an unstable circulation. The appearance of the patient, how he feels, the 24 hour urinary output level, the periodic determination of the red count, hemoglobin, or hematocrit are all relatively easy and of value in determining continuing hemorrhage and its severity. The patient with rapid hemorrhage is hospitalized as much to begin therapy as for observation. The immediate therapy consists of the liberal use of transfusions, bedrest, sedation such as the administration of phenobarbital, hourly feeding of an ulcer diet, and the use of antispasmodics, banthine, and antacids. Gastric suction is used only to control persistent vomiting. Gastric roentgenography may be used during this period if it is done carefully and with consummate gentleness to aid in the diagnosis.

The following types of cases are considered for possible emergency surgery:

1. Patients over the age of 50 with severe hemorrhage, because they may be bleeding from arteriosclerotic vessels that cannot easily contract or thrombose.

2. Patients who have been in peripheral vascular collapse; these are watched because the bleeding is presumably rapid, and are operated on early.

3. Patients who cannot be stabilized with several transfusions in the first few hours.

4. Patients who have a recurrent, rapid bleeding after a quiescent interval.

5. Patients with hemorrhage exceeding a rate of 1,500 c.c. daily.

6. Patients bleeding slowly and persistently for 2 or 3 days.

Before an emergency operation is performed, certain criteria must be satisfied. The patient must be free from constitutional contraindications which would preclude successful surgery or preclude the use of general or continuous spinal anesthesia. Esophageal varices as a source of bleeding must be excluded and this may require esophagoscopy under anesthesia just before the abdominal procedure is started. It is best to know the source of bleeding before surgery, but this cannot always be the case.

The surgical treatment for either a bleeding gastric or duodenal ulcer must of necessity be subtotal gastric resection. In duodenal ulcers, the bleeding vessel in the ulcer bed should be ligated and the ulcer area excluded, if possible, from the closed duodenal stump. If closure of the duodenum is impossible, closure may be done quickly around the catheter led out from the end of the duodenum.

When an active bleeding lesion is not found at surgery, gastroscopy with a sterile sigmoidoscope through the wall of the stomach with air inflation is of aid. "Blind" gastric resection when bleeding is present without an obvious lesion is not recommended.

Many severe hemorrhages from the upper gastrointestinal tract may cease spontaneously. In such cases diagnosis should be established as soon as possible after the bleeding has stopped, if not already done, rather than waiting 10 to 14 days as has been formerly advocated.

The control of bleeding esophageal varices is discussed, but no single procedure to control it is advocated over any others.

FREDERICK C. HOEBEL, M.D.

Gastric Resection for Upper Gastrointestinal Hemorrhage of Undetermined Cause. DONALD R. COOPER and L. KRAEER FERGUSON. *J. Am. M. Ass.*, 1953, 151: 879.

In a series of 18 patients operated on as an emergency measure for the control of upper gastrointestinal hemorrhage, 6 showed no evidence of the source of hemorrhage after thorough exploration. In each instance a resectable mucosal erosion or acute ulceration was established as the source of bleeding. In 1 patient resection was not done, and the patient subsequently bled to death from a resectable lesion, as demonstrated at autopsy. In the remaining 5 patients, subtotal gastric resestion was done. The difficulty of establishing the diagnosis of superficial gastric erosion preoperatively, at operation, or sometimes even in the resected specimen is emphasized. The necessity of an established diagnosis of peptic ulcer as a prerequisite for emergency operation in massive upper gastrointestinal hemorrhage is, therefore, questioned. The authors proceed as follows:

1. The patient must be found to have massive upper gastrointestinal hemorrhage. The term massive implies a rapid rate of blood loss. When the rate of blood loss is sufficiently rapid to produce the clinical picture of shock or to necessitate the administration of 1,500 c.c. or more of blood per 24 hours to properly stabilize the patient and replenish lost erythrocytes, the hemorrhage may be considered massive.

2. The usual causes of hemorrhage that do not require surgical treatment must be ruled out. Proper hematological studies to eliminate the blood dyscrasias can be accomplished quickly. It is seldom necessary to resort to either roentgenographic or esophagoscopic examinations to rule out esophageal varices. Zamcheck and his associates have shown

the value of the simple sulfobromophthalein sodium retention test in such an emergency; a negative result indicates that hepatic disease of sufficient severity to cause portal hypertension is not present. Bleeding from esophageal varices would then be limited to the small group of patients with extrahepatic portal hypertension.

3. A trial of conservative management is initiated immediately in the belief that the great majority of patients will respond without operation.

Having satisfied the above requirements, subtotal gastrectomy is carried out on the following patients:

1. Any patient in whom bleeding has not stopped in 48 hours. This 48 hour period is the outside limit, but is often shortened. The decision to operate in less than 48 hours is based on the rate of bleeding, the patient's age, a history of previous hemorrhage, and inability to clinically stabilize the patient.

2. Any patient whose hemorrhage is controlled on a medical regimen and who, while hospitalized, experiences recurrent bleeding is operated upon without delay.

3. The patient, seen occasionally, with a rapidly exsanguinating hemorrhage is operated on without a conservative trial. It is believed that the hemorrhage in such patients must originate from a major artery and that procrastination, with treatment by anything but direct surgical attack on the bleeding point, is hazardous. EARL O. LATIMER, M.D.

Crohn's Disease Involving the Stomach. F. R. R. MARTIN and R. J. CARR. *Brit. M. J.*, 1953, 1: 700.

The authors report 2 cases of Crohn's disease occurring in the stomach and duodenum. The first patient's disease was proved by laparotomy and biopsy. In addition, the patient was followed up and found to have completely recovered from involvement of this portion of her gastrointestinal tract after a year. Instead, she presented evidence of the typical lesion in the terminal ileum. The second case was diagnosed by x-ray and clinical study, but the condition was not confirmed by biopsy.

Anorexia and vomiting in Crohn's disease are usually believed to be the result of intestinal obstruction. The authors believe, however, that if this has not been proved, search should be made for the disease in the stomach and duodenum. Attention is also called to the x-ray findings and to the great disturbance in nutrition when the disease arises at such a high level in the gastrointestinal tract.

DONALD C. GEIST, M.D.

Tumors of the Superior Pole of the Stomach; Clinical, Diagnostic, and Therapeutic Considerations Based on 22 Cases. E. DELANNOY, P. GAUTIER, A. SOULIER, and A. TACQUET. *Lille chir.*, 1953, 8: 9.

The authors have collected 22 cases of tumor of the superior pole of the stomach during the past 3 years. From this study, they review the classical signs that permit an early diagnosis. The principal roentgenological and endoscopic aspects of this disease are also considered. The surgical treatment best suited to this type of gastric cancer and the results obtained in this series of cases received critical observation.

In the light of the authors' experience, there is no one clinical symptom that suggests a tumor of the upper pole of the stomach. In the presence of epigastric pain that is not proved to be due to ulcer or dysphagia without a lesion of the esophagus, an unexplained loss of weight suggests the necessity for examination of the superior pole of the stomach.

In a study of 22 cases, the epigastric pain suggesting gastric ulcer was present in 50 per cent of the cases. While dysphagia and emaciation were rarely encountered at the onset, they appeared during the course of the disease.

The superior polar tumors were generally visible on the standard roentgenograms of the stomach, but often were unrecognized unless the radiologist gave special attention to this region. If serial pictures were made of the superior polar gastric region, as they are made of the duodenum, many of these cases would be discovered early in the course of the disease. It may be necessary to utilize methods such as pneumoperitoneum associated with or without gastric insufflation, according to the technique of Porcher, or tomographs with the insufflation air bubble as described by Lambling and Gueret. The most frequently found roentgen findings in tumors of the superior pole of the stomach are loss of the usual flexibility of the stomach in that region, change in the mucosal pattern with filling defects, and deformation of the esophagus.

Gastroscopic examination can give valuable information in this type of case. The authors suggest esophageal catheterization prior to the passage of the gastroscope. In this manner, they can determine the existence of obstruction in the esophagus and also establish the permeability of the cardia. The retrovision lens on the gastroscope is quite useful, permitting a differential diagnosis between gastric cancer, gastritis, and pseudotumors.

With progress in the field of anesthesia, the ability to control surgical shock, as well as experience gained through the surgical treatment of cancers of the esophagus, the operative approach to tumors of the superior pole of the stomach has received renewed interest. As in all cancers, treatment consists in removal of the tumor-bearing area or, more frequently today, in removal of the entire organ that contains the cancer. To this end, three approaches to the upper pole of the stomach are available—the abdominal, with median or oblique incision; the thoracic or thoracicodiaphragmatic; and the combined abdominothoracic approach.

In 3 of the 12 operable patients the abdominal approach to the stomach was used. Three operations were performed through a transpleurodiaphragmatic incision, and the remaining patients were subjected to abdominothoracic incisions.

Through the abdominal incision 1 patient was subjected to a subtotal gastrectomy with splenecto-

my and resection of the tail of the pancreas, while 2 patients were subjected to total gastrectomy with splenectomy.

Two superior polar gastrectomies were performed through the thoracic route. Three superior polar gastrectomies and 4 total gastrectomies with splenectomy were done through the combined thoracoabdominal incision. Three of the patients also had resection of the tail of the pancreas through this type of incision. It was the practice of the surgeons also to remove a section of the esophagus.

While total gastrectomy in principle is the operation of choice, it is advisable to conserve as much functioning gastric tissue as possible in order to avoid subsequent poor function associated with anastomosis of the esophagus and the jejunum.

A splenectomy is usually necessary because of the close anatomical connection between the glands of the stomach and the spleen. While the tumor of the stomach is rarely adherent to the spleen, the existence of enlarged glands at the hilus between the two organs makes this type of surgery necessary. The surgical approach to the stomach is made a great deal easier and a block dissection can be made if the spleen is removed first.

Of the 22 cases reported, 10 were found to be inoperable and 12 were amenable to surgery. The mortality was 58 per cent—7 deaths and 5 operative cures. With the experience gained in treating this type of case, Quenu had only 1 death among his last 9 surgical interventions.

The results of surgery on the 5 patients that survived were as follows: 1 patient was in good physical condition 6 months after surgery, a second patient had metastases with jaundice 3 months after operation, the third patient had some difficulty with the gastric stump 18 months after surgery, the fourth patient was well for 2 years, and the fifth patient was well 1 year after surgery.

The present results are poor and the mortality is high, but with perfection of the surgical technique as well as early diagnosis of tumors of the superior pole of the stomach not only will the number of inoperable cancers be reduced but the results will be greatly improved. CONRAD A. KUEHN, M.D.

Carcinoma of the Stomach. Necessity for Revaluation of Therapeutic Philosophy. ALTON OCHSNER and JOHN BLALOCK. *J. Am. M. Ass.*, 1953, 151: 1377.

The authors present an extensive review of the current literature on gastric carcinoma together with the collected statistics from the Ochsner Clinic. They are of the opinion that although total gastrectomy has its place and indications, radical subtotal gastrectomy gives excellent results when it can be done.

The statistics on the authors' series show that exploration was done in 76.6 per cent of the cases, and resection in 33.3 per cent. Twenty-five per cent of the patients survived resection and 9.9 per cent were alive at the end of 5 years.

A plea is made for earlier diagnosis rather than more radical surgery. Surgical therapy should include a more aggressive attack on the gastric ulcer, more attention to the persistent symptoms in the absence of positive laboratory findings, and more frequent abdominal explorations in patients with such symptoms if the salvage rate on gastric cancer is to be improved. W. FOSTER MONTGOMERY, M.D.

Acute Perforation of Gastric Carcinoma into the Peritoneal Cavity (Perforazione acuta di cancro gastrico in peritoneo libero). ATTILIO BELLAVIA. *Arch. ital. mal. app. diger.*, 1952, 18: 391.

The author points out that perforation is a frequent complication of gastroduodenal ulcers, but it is a rather unusual complication of a gastric neoplasm. The author was able to find only 7 cases that had appeared in the Italian literature.

One case history is presented. The patient complained of a heavy feeling in the epigastric region which gradually changed to postprandial pain, but the patient did not attach much significance to this. Later the patient was awakened from a sound sleep with a sharp stabbing pain in the epigastric region. He was immediately hospitalized. Operative intervention revealed a perforation on the lesser curvature near the pylorus. Gastric juice was found to be free in the peritoneal cavity. A mass was palpated which was believed to be a carcinoma. The perforation was simply sutured and external drainage was applied.

The patient was readmitted to the hospital a month later for further operative intervention. At this time a large gastric mass which was adherent to the liver and pancreas was found. A subtotal gastric resection was carried out. The pathological diagnosis was adenocarcinoma and chronic ulcer with developing carcinoma. The author raises the question as to whether the ulcer was originally carcinomatous and discusses the various hypothesis concerning the development of carcinoma in benign ulcers.

Perforation is less frequently encountered in association with gastric carcinoma than with benign gastric ulcer for the following reasons: (1) carcinoma of the stomach occurs less frequently than gastric ulcer, and (2) carcinoma tends to remain more superficial than peptic ulcer so that the muscular layers serve as a protective barrier.

According to the author's findings the incidence of perforation in benign ulcers is approximately 8 per cent, whereas in carcinoma it is approximately 0.9 to 1 per cent. The most frequent sites of perforation are near the pylorus and on the lesser curvature. The perforations are usually single.

Acute gastric perforation in carcinoma is usually followed by the death of the patient. The diagnosis should be suspected in patients over 50 years of age and patients with vague gastric complaints which are not relieved by the ingestion of food.

In conclusion, one must add that the prognosis is grave and the mortality is high with any form of treatment. FRANK W. PIRRUCCELLO, M.D.

My Experiences with 3,020 Operations for Gastric Cancer (Meine Erfahrungen bei 3,020 Operationen wegen Magenkrebs). H. FINSTERER. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1953, 273: 611.

All patients with gastric carcinoma were operated on under local anesthesia of the abdominal wall combined with splanchnic anesthesia and supplemented in exceptional cases by evipan or ether. Of the private patients, 11.6 per cent were between 70 and 88 years of age. Ascites was not considered a contraindication to exploration. One patient with ascites was alive 16 years after resection of the stomach, pancreas, and part of the colon. Primary resection was performed on patients with palpable tumors and also those with a great loss of weight. Therefore, the author does not favor primary gastroenterostomy followed by resection after the general condition has improved.

Exploratory laparotomy is performed if the diagnosis is uncertain.

Great emphasis is laid on the removal of the entire greater and lesser omentum, including all palpable glands. Resection of the mesocolon is sufficient if its base is invaded by the tumor. Only if the arcades are also invaded, is it necessary to resect the colon.

Of 27 patients who underwent resection of the stomach, pancreas, and colon, 15 succumbed to the operation. Single stage colon anastomosis should be avoided in such cases because of the danger of digestion of the anastomotic line by pancreatic secretion. The mortality following resection of the stomach and pancreas was 35.4 per cent. Resectability of gastric carcinoma ranged from 66.3 per cent among private patients to 57.7 per cent in the charity cases. Total gastric resection was performed in 2.3 per cent of the private patients and 6.7 per cent of those in charitable institutions.

The mortality after subtotal resection in private patients was 9.2 per cent. It rose to 41.3 per cent in the group in which adjoining organs had to be resected. The corresponding figures in the charity hospitals were 17.5 and 35.4 per cent, respectively. The mortality following total gastric resection was 57.3 per cent.

Five year cures were recorded in 20 per cent of the private patients and in 29.3 per cent of the charity patients. JOSEPH K. NARAT, M.D.

Total Gastrectomy or Not in Cancer? LARS TROELL. *Acta chir. scand.*, 1953, 104: 341.

In this study an attempt was made to evaluate total gastrectomy in carcinoma of the stomach not only with regard to the immediate operative mortality but also with regard to the state of health of the survivors and the course of the disease in untreated cases.

A series of 54 total gastrectomies performed at the Karolinska Sjukhuset, Stockholm, was investigated. For purposes of comparison a series of inoperable cases and of resections was concurrently studied. The latter groups represented a total of 434 cases.

There was a total mortality of 51 per cent among the 54 cases of total gastrectomy. The late results in 26 survivors indicated that 19 required nursing, while only 7 were fully or partially fit for work for 1 or 2 years. One patient was able to work for 4 years. Comparison of these results with those of exploratory laparotomy and of resection showed that after exploratory laparotomy 90 per cent of the patients died within 1 year. Following resection 80 per cent of the patients died within 5 years. This is interesting in view of the fact that 90 per cent of the patients with total gastrectomy died within 3 years.

If penetration through the serosa occurred or if regional lymph node metastasis was present at operation, the value of radical operation was greatly diminished even if total gastrectomy was done. Earlier diagnosis is apparently the only hope for better results. In view of this experience the author regards the indications for total gastrectomy very narrow. HAROLD LAUFMAN, M.D.

Total Gastrectomy and the Formation of a "New Stomach" from the Small Intestine (In Bulgarian). G. POPOV. *Chirur. Sof.*, 1952, 5: 523.

Six total gastrectomies with the formation of a new stomach have been done so far. The patients were all in an advanced, indeed otherwise hopeless, stage of cardial gastric cancer. Four of them died as a result of the operation itself (1 died of incarceration of an ileal loop behind the ileoduodenal anastomosis of the "new stomach"). Two are living and not complaining; however, they are both in a severe anemic state with their hemoglobin under 40 per cent. A roentgenogram and a kymogram show that the new stomach actually retains a part of the barium suspension for some time, and that it exhibits peristaltic waves. The medial border of the gastric shadow shows a cranial direction of the waves, and the lateral border exhibits a caudal direction. The peristaltic waves were of small amplitude and were irregular in sequence.

The technique of operation consists of a supraumbilical midline incision under local anesthesia, extended on occasion toward the left costal arch. The transthoracic route was not used in this material; it was not used unless there was evidence of involvement of the esophagus for some distance upward. The usual total gastrectomy is done and then a loop of ileum is drawn up through an incision in the transverse mesocolon. The two ends of the loop are cut through and the afferent opening is closed blindly; the efferent end is left open for anastomosis with the duodenum. The lumina of the two branches of this loop are then united into one cavity by means of a wide anastomosis (the new stomach). The cranial terminus of the anterior anastomotic suture line is left open at its upper end for anastomosis with the esophagus. Keeping the new stomach at a considerable distance from the esophageal stump, the posterior first and second external rows of long silk anastomotic su-

tures are applied—including the adjacent portion of the diaphragm in the bite (suspension of the new stomach on the diaphragm)—and are then passed at corresponding points through the posterior anastomotic lip of the gastroesophageal anastomotic opening of the new stomach. After all these sutures have been placed the new stomach is brought up to contact with the posterior lip of the esophageal lumen and these long interrupted silk sutures are tied, one after the other. These sutures are rather widely spaced in order to preserve, in so far as possible, the blood supply to the esophageal stump. The continuous line of catgut mucosal sutures are then placed and the line carried around anteriorly. The anastomosis is then completed in the usual manner, including also the diaphragmatic tissues in front. The operation is completed by end-to-end anastomosis of the new stomach to the duodenum. The abdominal wound is closed as usual and a small drain is introduced through a stab opening on the left side, through which penicillin may be introduced about the operative region.

The author considers his results sufficiently encouraging to recommend that the method be applied also in less desperate conditions than those present in his material. He considers that the method is better than that recommended by Marshall for 2 reasons: the first reason is that Marshall's method comprises 2 major surgical procedures, that is, a total gastrectomy and its substitution by an inverted and isolated cecum and portion of the ascending colon; the second reason is that the substituting cecum is less adapted physiologically for the task of substituting for the stomach.

JOHN W. BRENNAN, M.D.

Regional Enteritis and Allergy (Entérite régionale et allergie). W. F. SUERMONDT. *Acta gastroenter. belg.*, 1953, 16: 45.

The author, of the Surgical Department of the University of Leyden (Netherlands), propounds the theory that regional enteritis and especially terminal ileitis is probably due to alimentary allergy in which the intestine plays the role of a shocked organ.

He differentiates two stages of the disease: an acute stage which may disappear completely and spontaneously, and a chronic stage with stenoses, abscess, and fistula formation. In the acute stage the intestinal mucosa is hyperemic and very edematous. Histologically, infiltration with lymphocytes, plasmocytes, and eosinophils is found in the mucosa, submucosa, and in the subserosa.

Regional enteritis is never caused primarily by any specific infection; abscess and fistula formation develop by secondary infection of the damaged mucosa.

Not infrequently, the disease recurs even after radical surgery at some other portion of the intestine. The terminal ileum is involved most often; however, the same process may occur at the jejunum or other parts of the intestine.

The acute stage should be treated with cortisone or ACTH, antihistamines, and, prophylactically, with antibiotics or sulfonamides. This treatment does not clear up an existing allergic edema but it can prevent other allergic reactions by improving the resistance of the capillaries and diminishing the permeability of the capillary walls. Naturally, it would be very important to avoid foods provoking allergenic reactions, but it is nearly impossible to determine what allergen starts the reaction.

In the chronic stage with severe regional infection, antiallergic therapy does not have any value. Only surgery will give relief in such cases, but numerous cases are on record in which the disease recurred even after radical resection.

The writer reports on 18 cases of his own, in 17 of which surgery was done. In 14 cases terminal ileitis was present, in 2 cases regional jejunitis, in 1 case regional ileitis, and in another case regional ileitis combined with regional colitis was found.

The early results of surgery were good in all 17 cases, but 5 presented recurrences. One of the recurrences took place 11 years after an interval of perfect health. WERNER M. SOLMITZ, M.D.

Intussusception of the Vermiform Appendix, with a Report of 7 Cases in Children. ISABELLA FORSHALL. *Brit. J. Surg.*, 1953, 40: 305.

Since M'Kidd, of Elgin, in 1858, described intussusception of the vermiform appendix, approximately 100 cases have been reported. The condition occurs more commonly in male children under 10 years of age. In over one-half of 25 cases there was a compound intussusception. Certain anatomical conditions (fetal type of cecum; wide appendicular lumen; narrow-based thin mesoappendix; no fixation by adhesions; and a healthy muscular walled-appendix) tend to increase the likelihood of intussusception of the appendix. Anatomically the intussusception may be simple or compound. The several types of simple and compound intussusception are illustrated.

Four groups of clinical symptoms are noted:

1. The history of vomiting, colicky pain, and tenderness in the right lower quadrant suggests acute appendicitis. The time is recorded in hours.
2. Time is recorded in days, with the history of periodic abdominal pain, slight change of bowel habit and a palpable mass, thus simulating the usual type of intussusception.
3. The history of repeated episodes of acute abdominal pain with freedom from symptoms or signs between attacks. This history is recorded in years.
4. A completely asymptomatic group.

The treatment consists of removal of the invaginated appendix following reduction of the intussusception. JERRY A. STIRMAN, M.D.

Globular Myxomas of the Appendix (La mixoglobulosi dell'appendice vermiforme). GIUSEPPE MONETTI. *Arch. ital. mal. app. diger.*, 1952, 18: 363.

In a previous article the author reported a case of globular myxoma of the appendix and in the present article an extensive review of the literature on the condition is analyzed.

The term "globular myxoma of the appendix" is limited to a specific form of mucocele in which the epithelial mucoid cells are conglomerated into numerous spheres presenting a microscopic multiloculated appearance.

Up to 1950, the author has collected 53 cases reported in the literature. The condition is three times more common in the male than in the female, and most frequent in the third to sixth decade of life.

Pathologically, the appendix is irregularly enlarged, distended but firm to pressure, and in all cases the communication with the lumen of the cecum is obliterated. Microscopically, the crypts are deep and filiform. The mucosal surface is intact and stratified by albuminous vesicular spheres deposited like mucoid calculi. The etiological mechanisms appear to be a closure of the lumen of the appendix, hypersecretion of the mucous, and focal microscopic deposition about the epithelial cells.

The clinical picture simulates closely that of appendicitis. Chronic mild attacks are more characteristic with the presence of a palpable mass in the right iliac fossa. The only associated condition that has appeared in the literature is that of mucocele of the ovary. Perforation with peritoneal implants has appeared in 7 of the 53 cases reported. Despite perforation, cellulitis and abscess formation are rare because the cecal communication is occluded.

The treatment of choice is appendectomy, and it is not necessary to remove extensive peritoneal implants following perforation, which can be followed by roentgen therapy.

The prognosis is good and recurrence has not been reported in the literature.

ROLAND A. MANFREDI, M.D.

Total Volvulus of the Small Intestine (Le volvulus total de l'intestin grêle). R. JOYEUX and A. COURTY. *J. chir.*, Par., 1953, 69: 293.

From a case material consisting of 4 patients with volvulus of the small intestine, the authors conclude that the accompanying toxemia and shock render the condition much more serious than a partial volvulus.

Three patients were men, 37, 42, and 58 years of age, respectively, and 1 patient was a woman, aged 51. In the first patient, who expired under the anesthetic before the start of the operation, a strangulated loop in a mesenteric slit and complete volvulus of the small intestines were found. The second patient, in whom the same condition was associated with postoperative adhesions in the region of the distal end of the ileum, succumbed to a postoperative pulmonary complication. The third patient had a subtotal volvulus of the small intestine associated with an adhesion in the region of the gastroenterostomy. He recovered following the operation. The fourth patient, who had an uncomplicated total volvulus, developed a fatal pulmonary complication following detorsion of the intestine.

Only 61 cases of total volvulus of the small intestine have been reported. The ratio of the incidence of this condition to that of partial volvulus is from 1 to 8 to 1 to 12. Torsion in clockwise direction is more frequent than that in the opposite direction. Abnormal length of the mesentery is not always found.

Abdominal distention is absent in the early stages of the condition. Excruciating pain, either continuous or intermittent, is localized chiefly in the umbilical region. The patient is agitated and is vomiting, his face is pale and covered with perspiration, his pulse is soft and rapid, but his temperature normal. Remissions may create unjustified optimism and delay the operation. Contrary to partial volvulus which produces an early, localized abdominal distention, in the early stages of complete volvulus nothing significant may be found on examination of the abdomen. Sometimes tympanites may be detected in the left hypochondrium.

Roentgen films taken in early stages of the condition may fail to reveal distended loops but one sign is frequently found, namely, transposition of the jejunum and ileum; the latter may be seen under the left diaphragm while the jejunum is visualized in the right lower quadrant of the abdomen. The ingestion of barium is not contraindicated, provided duodenal intubation and operation are undertaken without delay.

JOSEPH K. NARAT, M.D.

The Study of Sigmoid Diverticula (Contributo allo studio della sigmoidite diverticolare). LUCIO PICCINNI. *Ann. ital. chir.*, 1952, 29: 829.

The author reports a single case of diverticulosis of the sigmoid colon in approximately 18,000 surgical cases observed over a period of 12 years at the Bologna Surgical Clinic in Italy. He believes this exemplifies the rarity of the disease among Italian people and people of Latin extraction.

The case cited by the author was that of a 58 year old male who had experienced vague left lower quadrant pain. This evidently was the first manifestation of the patient's disease. Chemotherapy produced a prompt remission. Approximately 1 year later the patient developed an exacerbation of his symptoms of pain and fever and a mass in the left lower quadrant. Antibiotic therapy resolved the symptoms favorably. Approximately a year after this the patient developed his symptoms again in an acute manner with perforation and the development of purulent peritonitis. A cecostomy was carried out and the patient had an uneventful recovery.

Another year later the patient developed a recurrent episode of pain and at this time developed a sigmoidocutaneous fistula. Approximately 5 years from the time of the original symptoms another cecostomy was carried out and resection of the involved sigmoid was carried out with an end-to-end anastomosis. The patient had an uneventful postoperative course and evidently recovered completely.

The author discusses the complications that can arise from diverticulitis. He discusses the symptomatology and the roentgenological findings. Therapy falls into several categories according to the author. In acute diverticulitis of the simple type,

conservative medical management should be carried out. In acute solitary isolated diverticulitis, a diverticulectomy should be performed. In multiple diverticulitis, resection in two stages by the Mikulicz procedure or resection with end-to-end anastomosis should be carried out. In pericolic abscess, incision and drainage is indicated. In perforating diverticulitis, resection in two stages after the Mikulicz procedure is advisable. In stenotic hypertrophic diverticulitis, resection in two stages after the Mikulicz procedure or resection with end-to-end anastomosis is indicated. In the occlusive phase of stenotic hypertrophic diverticulitis, resection in three stages by the Schloffer and Mikulicz procedure is the method of choice. In sigmoidocutaneous fistula or vesicosigmoidal fistula, resection in three stages after Schloffer and Mikulicz should be carried out, according to the author.

FRANK W. PIRRUCCELLO, M.D.

Surgical Treatment of Diverticulitis of the Colon. MARSHALL K. BARTLETT and WILLIAM V. MCDERMOTT. *N. England J. M.*, 1953, 248: 497.

Apparent success in the medical management of most cases of diverticulitis has led to procrastination in the application of proper surgical methods of treatment. Subacute and chronic inflammation lead to insidious debilitation. Recurrent attacks of acute diverticulitis, and the major complications such as perforation, obstruction, and hemorrhage demand long and expensive treatment, and might well be prevented by the proper selection of cases for elective resection.

Frequent recurrent bouts of acute diverticulitis, failure of an acute episode to subside on conservative management, and evidence of persistent low grade inflammation constitute indications for prophylactic surgery, as exemplified by 3 case presentations. Persistent occult bleeding from the gastrointestinal tract with evidence of diverticulitis demanded operation to rule out a neoplasm in another case. Resection of the involved area of the colon at the time of exploration yielded excellent results.

The low morbidity and mortality of resection with modern techniques and management further promote the use of elective resection in selected cases. A plea is made for more careful study of patients with this disease, in order to determine which should have prophylactic resection.

JOHN J. MURPHY, M.D.

Cancer of the Colon and Rectum. HENRY W. CAVE, KENNETH M. LEWIS, JR., and WALTER T. WICHERN. *Surg. Clin. N. America*, 1953, 33: 443.

A series of 510 patients with malignant lesions of the large intestine were operated upon. Twenty-two per cent of this group were found to be inoperable and some form of proximal decompression was carried out. It was possible to resect the primary lesion in 398 instances (78 per cent), but there was evidence of gross involvement of the liver in 27 and of the peritoneum in 17 instances. The hospital mortality for the entire group was 10.5 per cent, or 55 deaths in 510 operative procedures. There were 26 deaths (6.5%) in 398 resections of the primary tumor, and 29 deaths (25.9%) among 112 patients in whom the primary tumor could not be removed and some form of palliation was carried out.

The cause of death in resection for carcinoma of the large bowel was predominantly cardiovascular insufficiency, with peritonitis second, pulmonary embolism third, and pneumonia, renal insufficiency, hepatic insufficiency, and anesthetic death occurring in diminishing order of frequency. In 20 deaths which occurred during convalescence from the operative procedure, but before the patient left the hospital, coronary thrombosis, cerebrovascular accident, cirrhosis, pulmonary tuberculosis, primary carcinoma outside of the colon and the rectum, and suicide were responsible.

Of the 510 patients 55 were lost to follow-up. Twenty-four patients who were alive and well at the end of 5 years without evidence of recurrence of their disease subsequently died of carcinoma. In 17 instances it was a recurrence of the colon carcinoma; in 8 it was from carcinoma other than in the colon. This points up once again the well known but occasionally forgotten fact that the term "5 year cure" is little more than a convenient yardstick when used in connection with patients suffering from malignant disease. It gives an approximate idea of the end results in a group of patients with malignant disease in one site or another, but it cannot be applied to the individual patient.

Surgical resection of the malignant lesion of the large intestine carried out before there is extension to subtending lymph nodes or adjacent or distal viscera offers greater opportunity for survival than surgery for carcinoma in any other portion of the gastrointestinal tract. Every symptom, however vague, should be evaluated in this light and all diagnostic procedures should be exhausted. Polypoid lesions of the colon and of the rectum are of immeasurable importance and when recognized should be promptly and completely removed because of the close relationship they bear to carcinoma in the same area.

Of 141 polyps, 80 per cent were found to be benign, 14 per cent were premalignant, 6 per cent were malignant, and 12 per cent were associated with carcinoma. HAROLD LAUFMAN, M.D.

Surgical Treatment of Cancer of the Rectum and of the Lower Sigmoid (Le traitement chirurgical du cancer du rectum et du bas du sigmoide). P. DECKER and R. MOSIMANN. *Helvet. chir. acta*, 1953, 20: 1.

Preservation of the normal function of the anal sphincter may be expected if at least 4 cm. of the rectum are left in situ above the sphincter. The resection of cancer of the rectum or of the lower sigmoid should include no less than 15 cm. above and 5 cm. below the lesion. Inasmuch as the cul-de-sac descends as low as 8 cm. above the anus, it follows

that only tumors of the sigmoid located above the peritoneal reflection are suitable for resection with re-establishment of continuity.

Tumors situated within the lowest 8 cm. of the gut can be divided into 2 classes: (1) those in the anal canal, which require amputation with sacrifice of the sphincter, and (2) those in the rectal ampulla which should be treated by amputation with colostomy or by a pull-through operation. In order to bring the sigmoid loop down to the anus, the surgeon may be tempted to make the cuff above the tumor too low. Furthermore, preservation of the function of the sphincter is accomplished in less than 50 per cent of the cases. Colostomy is less burdensome than anal incontinence. It is technically difficult to create a secondary colostomy when all available sigmoid has been pulled down and, finally, the anal fistula persists. Therefore, as a rule, the authors do not recommend the pull-through operation.

Posterior resection is not sufficiently radical, but anterior resection meets with the same objection because technical difficulties may prevent proper dissection of the extraperitoneal portion of the rectum. Therefore, the authors favor perineoabdominoperineal resection. They do not employ colostomy routinely because (1) its closure requires a second operation, and (2) its beneficial effect is frequently illusory, as colostomy does not prevent dehiscence of anastomotic sutures from necrosis of the proximal or distal margins of the united gut. The authors prefer the risk of a perineal fistula to the inconvenience of a colostomy to the patient and the danger connected with a secondary closure.

JOSEPH K. NARAT, M.D

LIVER, GALLBLADDER, PANCREAS, AND SPLEEN

An Operated Case of Fixed Total Hepatoptosis. JACK ADAMS-RAY. *Acta chir. scand.*, 1953, 104: 348.

Hepatoptosis has been ascribed to trauma, relaxed abdominal walls, or to congenital malformations. There have been only 6 cases reported in the literature prior to the present one. The case reported is that of a 27 year old male who suffered attacks of abdominal pain in the right upper quadrant without radiation. A preoperative diagnosis of gallbladder disease was made.

At laparotomy the cecum was found to lie up against the diaphragm and was broadly adherent to the upper posterior surface of the liver, which was turned laterally to the right. The entire liver was found to be rotated inward and downward and was intimately adherent to the midline of the anterior abdominal wall and surrounding bowel. The adhesions were separated by sharp dissection, and it was then possible to restore the liver to its proper position. The gallbladder had grossly thickened walls and contained thick turbid bile, but no stones. A cholecystectomy was performed. The liver was fixed with catgut sutures through remains of the adhesions. External drainage was provided.

The absence of trauma or relaxation of the abdominal wall indicated that the cause of the condition may have been a congenital anomaly. Follow-up examination 2 years after surgery showed the liver to be in its proper position.

HAROLD LAUFMAN, M.D.

Hepatic Artery Ligation for Portal Hypertension. GERARD DESFORGES, ALEXANDER J. A. CAMPBELL, and STANLEY L. ROBBINS. *Ann. Surg.*, 1953, 137: 507.

The theoretical basis for ligation of the hepatic artery in the treatment of portal hypertension is presented with a review of the work of Gad, Herrick, Whipple, McIndoe, and Rienhoff. Although it has been demonstrated that the livers of laboratory animals are contaminated during life by anaerobic bacteria, that the oxygen content of hepatic artery blood controls the growth of those organisms, and that laboratory animals can survive hepatic artery ligation if large doses of penicillin or aureomycin are administered, it has not been shown that human livers are hosts to similar bacteria.

Ligations of the hepatic arteries distal to the origin of the gastroduodenal arteries were performed in 4 patients with portal hypertension arising from long-standing hepatic cirrhosis. In 3 patients slight improvement in the hypertension seemed to occur; in one patient the reaccumulation of ascitic fluid was moderately decreased and in another the liver function tests showed improvement. Liver biopsy studies revealed no significant changes. In the main, the progress of the disease seemed to be affected but little. One patient died of massive hematemesis 2½ months after the operation. Another patient died of peritonitis after paracentesis of rapidly reaccumulating ascites 5½ months after operation.

In none of the patients was there any change of systemic blood pressure that might have been caused by hepatic anoxia.

The variable anatomy of the arterial supply to the liver is an obvious source of uncertainty in attempts to interrupt that supply. Although it may be argued that the fact of survival after hepatic artery ligation indicates the ability of the cirrhotic liver to tolerate a decreased arterial flow, the fact that the liver continues to receive arterial blood via several collateral routes refutes any argument that the cirrhotic liver may survive with portal blood alone.

LEONARD D. ROSENMAN, M.D.

Circulation in the Normal and Cirrhotic Liver. JACOB K. BERMAN and JAMES E. HULL. *Ann. Surg.*, 1953, 137: 424.

The authors compare the portal system to a reservoir of blood which receives its supply at a uniform rate, keeping its level constant. The portal vein-sinusoidal-hepatic vein arrangement in the normal liver may be compared to a continuous tube with a constriction in its course which results in a high pressure proximal to the narrowing and a lower pressure on the distal side. If measured by perpendicular tubes of uniform caliber along its course, a progres-

sive fall in pressure will be observed along the entire system due to energy lost in giving velocity to the fluid and in overcoming friction. As the flow continues, its lateral pressure will be close to zero in the hepatic veins and negative at the inferior vena cava.

In the normal liver the horizontal tubes are not of uniform caliber; therefore, the velocity is inversely proportional to the sectional area. If dilatations are present in the horizontal tubes, the velocity of the blood in this section will be reduced. Since lateral pressure is inversely proportional to velocity, the level of the fluid column in the perpendicular tube at the dilated site will be higher than the level of the tubes distal to these dilated areas. It is for this reason that an aneurysm or a varicosity tends to increase in size. The sacculations become larger since the widened bed of the stream causes a local reduction in velocity and a consequent increase in lateral pressure. This in turn causes a stretching of the vascular walls and further dilatation, thus a vicious circle is established. This is true whether the increase in the cross area of the stream is caused by a single dilatation or is due to a division of the tube into a number of smaller channels. So long as the total of the sectional areas of all the subdivisions is increased, no matter how small or how large they are individually, a reduction in velocity will always result.

If constrictions occur in the horizontal tube, the velocity in this section is increased and the pressure is reduced. If the constriction is placed along the line of the horizontal tube without other interference, a sharp drop in the lateral pressure will occur in the levels of fluid in the perpendicular tubes distal to the constriction (low pressure area) and a rise in pressure occurs on the proximal side of the constriction (high pressure area). However, there is still a fall on both sides of the constriction as energy is used in overcoming resistance and giving velocity to the stream. Should the flow be increased by widening the constricted area, lateral pressure proximal to the narrowing will fall and the pressure distal to this section will rise. Should the flow be reduced by narrowing the constriction, contrary effects will ensue in the two sides.

The total volume of blood flowing through the liver in a given time does not necessarily parallel the lineal velocity, although it should be stated that if the pressure head remains unchanged then the volume of blood flowing in a unit of time through a narrow tube is proportional to the fourth power of the diameter of that tube. These physical laws are applicable, though not exact, in the normal as well as in the cirrhotic liver.

Vasomotor influences play an important role in the normal liver, but are greatly reduced in the cirrhotic. Thus, in the normal, vasoconstriction of the entering vessels will cause an increase in lineal velocity. However, because of dilatations of the capillary bed and compensatory vasodilatations in other vascular areas, the volume of flow is unaltered or may actually be increased.

There is an increased resistance to linear flow in atrophic cirrhosis on account of the enormous amount of fibrous tissue. This causes a rise in pressure on the reservoir side and a fall in pressure on the other side of the resistance areas. Hepatic artery pressure is constant, but the sites of union between the hepatic artery and portal vein in the sinusoids are more intimately related in the cirrhotic than in the normal liver because of blunting and dissociation between the sinusoids and the hepatic vein, and also because of a lack of elasticity in the liver tissue. Therefore, the high pressure area is inordinately elevated by the inflow of hepatic arterial blood. The total cross-sectional area of the liver is decreased in size in cirrhosis and, therefore, the lineal velocity is increased and the volume flow reduced. Again referring to the physical properties of the rigid tube system in the cirrhotic liver, the horizontal tube at the constriction is discontinuous, and the increased velocity is transmitted through shunts in a reverse direction from hepatic artery to portal vein or in a forward current from portal to hepatic vein.

The hepatic venous pressure in Laennec's cirrhosis becomes lower than normal at first, then higher, because of the vascular short circuits. In fact, the height of the hepatic venous pressure is an indication of the extent of shunt mechanisms and, therefore, it may be used as a guide in the selection of cases which would be most benefited by hepatic artery ligation. There is a constant fall in pressure up to the constricted area in the liver which is known to be the juncture between the hepatic artery and the portal vein in the sinusoids. Distal to this area there is a precipitous fall which continues until the zero mark is reached. Normally this fall is more gradual because of the elasticity of the liver. This elasticity is lost in cirrhosis. Moreover, it is known from perfusion experiments that the hepatoportal juncture is more intimately associated in cirrhosis, and pressures are transmitted more directly between the hepatic artery and the portal vein. The effect of this arrangement will cause a decrease in the lineal flow and an increase in the lateral pressure on the portal side of the constriction with resultant dilatation of the portal branches. The portal pressure rises inordinately because of the added pressure of the hepatic artery through its intimate communication with the sinusoidal branches of the portal capillaries, which causes greater dilatations to occur in the portal veins. Collaterals form between the portal vein (high pressure area) and the systemic circulation (low pressure area) at various sites in the abdomen, principally around the esophagus, the rectum, the anterior abdominal wall, and retroperitoneal veins of Retzius. Some collaterals also form between the hepatic artery and the hepatic vein because of the great differentials in pressures of the two capillary systems within the liver. The liver cells seem to get little of this blood. Even normally the hepatic artery does not supply the liver parenchyma, but furnishes blood only to the walls of the blood vessels, biliary ducts, and perhaps the connective tissue.

It may be logically assumed that if the arterial inflow into the high pressure area with its added 120 mm. of Hg pressure could be eliminated, then part of the vicious circle might be restrained. Moreover, the hepatic arterioportal venous reflux could be ameliorated, and thereby permit more portal blood to enter.

Experimental and clinical investigations by the authors seem to indicate that their hypotheses concerning alterations of the hepatic blood flow in advanced portal cirrhosis with vascular decompensation are correct. Normal arteriovenous and venovenous shunts seem to be increased and new short circuits develop in cirrhosis. The rationale for hepatosplenic and left gastric arterial ligation becomes more apparent as a result of these studies.

EARL O. LATIMER, M.D.

Management of Acute Pancreatitis. J. EDWARD BERK. *J. Am. M. Ass.*, 1953, 152: 1.

The success of conservative treatment for acute pancreatitis depends upon the care and technique used in its application. It also requires continued appraisal of the patient's clinical and chemical states.

The first objective is to relieve pain. The nitrites are undesirable, albeit they relieve spasm of the smooth muscle, because of the short duration of their effect and their tendency to cause hypotension. Morphine and other opiates induce spasm of the duodenum and bile duct. Demerol has less such an effect and should be used rather than morphine. Tetraethylammonium chloride may give dramatic relief of pain, probably by reducing the pancreatic secretion and inhibiting the tone of the sphincter of Oddi. However, the hypotensive effects of the drug are serious and may countermand its use. Similarly, banthine may yield relief of pain. However, large doses are required (100 mgm. every 4 to 6 hours) and these may cause intolerable side effects. The intravenous injection of procaine may produce relief of pain by combined local anesthetic, vasodilating, and smooth muscle relaxing effects. Sensitivity reactions and central cardiovascular depression may complicate the use of procaine. A carefully regulated slow drip of dilute solution is a better method of administration than intermittent injections.

Although nerve blocks of the lumbar sympathetic and splanchnic nerve may be effective, the short-lived effects of, and the occasional hypotensive reaction following, the blocks contraindicate their routine use. Fractional epidural block by the injection of dilute procaine solution through an indwelling catheter has a longer duration, wider effects, and is less discomforting to the patient than paravertebral sympathetic blocks.

The second main consideration of conservative treatment is the search for and correction of dehydration, electrolyte imbalances, and insulin deficiency. Special attention must be given to calcium and potassium deficiencies of the circulation.

The third therapeutic aim is to reduce pancreatic secretory activity. This is accomplished by withholding food and keeping the stomach emptied of its secretions by applying suction to an inlying tube with brief periods of no suction during which antacids are instilled into the stomach, and by depressing nervous stimulation of the gastric and pancreatic secretion. This depression is accomplished by general sedation and by administering atropine or banthine. Sympathomimetic drugs are not recommended because of their vasoconstriction effects. The effects of x-rays on the damaged pancreas are uncertain; this type of therapy has little to recommend it.

The fourth item in treatment is the use of antibiotics to combat intraperitoneal and retroperitoneal infection. Aureomycin and terramycin are the drugs of choice because they are concentrated in bile.

In addition to the above main considerations, other measures may merit clinical application. Trypsin inhibitor from soybeans has been beneficial in dogs. Its value in human beings remains to be assessed. ACTH and cortisone have no proved value in acute pancreatitis.

Surgery may become necessary for the drainage of hematomas, abscesses, or cysts, or when obstruction to the bile ducts occurs.

When management of the acutely ill patient has succeeded in bringing him through the initial phases of his illness, the physician must investigate the biliary tract for associated and contributory defects, and evaluate the degree of residual pancreatic deficiency. Also, he must teach the patient to avoid dietary excesses and the use of alcohol, both being common precursors of acute attacks.

LEONARD D. ROSENMAN, M.D.

Rupture of the Spleen with Splenic Implants: Splenosis. Review of the Literature and Report of a Case. KENNETH A. STORSTEENA and WILLIAM H. REMINE. *Ann. Surg.*, 1953, 137: 551.

Autotransplantation of splenic tissue, or splenosis, occurring after traumatic rupture of the spleen is mentioned infrequently. This condition is, however, a definite clinical and pathologic entity; emphasis on its recognition may allow assumption of its rightful position among the diseases and conditions that confront the modern surgeon.

The authors review the literature and present a summary of all available reported cases of splenic implants that have occurred after traumatic rupture of the spleen. To this list they add a case of splenosis that was recently studied at the Mayo Clinic.

The incidence of splenosis is unknown but the condition must be rare, since review of the literature disclosed only 22 reported cases. The twenty-third case added by the authors was that of a patient who had undergone splenectomy for a ruptured spleen 5 years prior to a second operation, the latter being necessary for symptoms of intestinal obstruction. From 300 to 400 splenic nodules were present in the abdomen at the time of the second operation.

Splenic implants should not be confused with accessory spleens. Histologically, these implants contain characteristic splenic pulp but the supporting framework is incomplete.

Complications of splenosis are unlikely, but they do occur. Recurrence of hemolytic icterus and intestinal obstruction has been noted. Extreme caution should be observed during the performance of splenectomy so that chances for the development of postoperative splenosis are minimized.

MISCELLANEOUS

Primary Retroperitoneal Tumors. J. P. HERDMAN. *Brit. J. Surg.*, 1953, 40: 331.

Primary retroperitoneal tumors are defined as solid or cystic tumors which are found in the retroperitoneal space, but which have no anatomical connection with any of the organs of that region, and are not manifestations of a generalized disease. The 14 patients whose cases are reported were examined in the period from 1940 to 1949. Of the 14 patients, 11 were admitted to the Radcliffe Infirmary and represented one of 11,800 admissions.

These tumors were classified as (1) tumors of adrenogenitourinary origin, (2) tumors of connective tissue origin, and (3) simple cysts.

In 4 of the cases reported, the tumors were of adrenogenitourinary origin. These tumors probably arose from embryonic rests, the type depending on the stage of development when the cells separated.

In 8 of the cases in this series the tumor arose from connective tissue elements in the retroperitoneal space. Seven of these tumors were related to the fat-containing cells and demonstrated varying stages of differentiation; none of these tumors was a benign lipoma.

Two of the tumors were simple cysts. The cysts had a simple epithelial or fibrous tissue wall.

The two most common symptoms were pain of a nonspecific nature and an abdominal mass. The mass was palpable in all patients. The most useful auxiliary examination was an excretory urogram, usually demonstrating some abnormality of the ureter or kidney. Aortography and retroperitoneal air insufflation were not performed.

Surgical removal was the treatment of choice; irradiation was reserved for inoperable tumors. The prognosis of group III tumors (simple cysts) is excellent, whereas the prognosis of groups I and II (tumors of adrenogenitourinary origin and of connective tissue origin) is very poor. In this series, all except the 2 patients in group III died. In 5 of the 8 patients whose tumor was classified as group II, and in whom the tumor was thought to be completely excised, recurrence was noted in all 5. Repeated excision of the connective tissue tumors appears feasible and worth-while.

The results of other reported series cannot be correlated with this study because of the wide variation of classification of these tumors.

JERRY A. STIRMAN, M.D.

GYNECOLOGY

UTERUS

Femoral Hernial Incarceration of the Uterus (Su di un caso di ernia crurale dell'utero). NICOLA CARRILLO. *Rass. internaz. clin. ter.*, 1953, 33: 127.

A 64 year old mother of 6 normal children, without a history of abortion, entered the menopause when 40 years of age. Some years later she developed a prolapse of the vagina, which increased in size with time. About 15 years before she came for observation, walnut-sized tumefactions had been noted in the two femoral regions, which disappeared when she lay down. The swelling on the left side remained practically unchanged, but that on the right increased rather rapidly to the size of a large orange and then for 10 years remained that size. About 24 hours before she presented herself the tumefaction on the left side began to increase further in size, became painful, and could no longer be reduced. Vomiting, meteorism, and retention of feces and gas then occurred.

Examination disclosed a woman with a deteriorated general condition, anxious facies, and pallor of the skin and mucosae. The body was thin and the muscles hypotrophic. The tongue was coated and dry, and the pulse and respiration were accelerated; the heart tones in this patient were doubled at the apex.

The abdomen was swollen and rigid, and vaginal examination uncovered an acutely painful left vaginal fornix. The uterus could not be palpated because of the muscular defense. The femoral swelling was filled medially with a hard elastic mass and was tympanic laterally.

At operation the hernial sac contained some serosanguinous fluid, and a loop of the sigmoid colon and the uterus with the left tube were plainly visible. The hernial ring was notched and the viscera were reduced. The uterus could be drawn into the sac as far as the uterine cervix. The uterus was small and sclerotic and was removed by subtotal hysterectomy; in the elderly woman with hypotrophic changes it was considered advisable to perform this hysterectomy through the crural opening. The operation terminated with the usual hernial repair.

The author does not think that a congenital factor, such as the classic 'alae verpertilionis', was related to the development of this form of uterine herniation. He thinks that the age of the patient, her numerous pregnancies, and the evidence of muscular slackness and ptosic habitus (vaginal prolapse, hypotrophic uterus) were sufficient to produce the hernia.

He considers this instance of sufficient interest to warrant publication, especially since he is not aware of any previous reports of the inclusion of the entire uterine corpus in the contents of a hernial sac.

JOHN W. BRENNAN, M.D.

A Surgical Program for the Treatment of Cancer of the Cervix. Report of 5 Year Results. ALEXANDER BRUNSCHWIG. *Surg. Clin. N. America*, 1953, 33: 585.

For some time irradiation has been the treatment of choice for cancer of the cervix. This has been so because this method of therapy has produced some excellent results, it has a low mortality (about 2%), and it is more universally applicable than surgery. Radiation produces 5 year cures in approximately 40 per cent of the "fresh cases," but this figure does not provide for recurrence nor for carcinomas of the stump.

Since September, 1947, at the Memorial Hospital, New York, a surgical program for treating cancer of the cervix has been instituted. In only very extreme instances was operation not advised because of poor general condition. All ward and private patients (162) admitted from September, 1947 to July, 1948 are included in the series.

There were 58 patients who were not subjected to surgery or only to palliative surgery. Forty-five patients (28% of the series) were not subjected to operation. Nineteen were in stage I (League of Nations). Surgery was not done because of the poor risk in 7 cases, extension of the condition to the outside of the pelvis in 3 cases, refusal of operation in 5 cases. The patient went elsewhere in 7 cases, was lost to follow-up in 1 case, 6 patients went to other private physicians who treated by irradiation alone, and 16 patients received part or all of the preoperative irradiation but did not return for surgery. Of these patients not operated on, 10 (28.6%) are living and well after 5 years.

In 13 patients (7.1% of the series) only palliative procedures were feasible since the carcinoma had spread to the upper abdomen. None of them survived as long as 5 years. They represent surgical failures.

One hundred and four patients were subjected to major excisional surgery. As the International Classification is based upon clinical findings only, with limitation in accuracy, a new classification based upon the pathological findings at operation has been devised. Previous treatment is not taken into account in the classification. Stump carcinomas and adenocarcinomas of the cervix are included. The standard operation was the radical hysterectomy and pelvic lymph node excision. In 1 "poor risk" patient a classical Wertheim operation was done, in 5 others a radical Schauta operation was performed. When the bladder was invaded a partial exenteration was carried out. When both the bladder and rectum were involved, a total pelvic exenteration was done. The major groupings of the classification and the survival rates follow:

Class A (cancer limited to the cervix) 43 cases, 36 survivals—83 per cent.

Class B (lesion extended to upper vagina, no more than upper third) and/or lower uterine segment with no node metastases, 11 cases, 5 survivals —45 per cent.

Class C (lesion spread to one or both parametria and/or metastases to the parametrial nodes and/or ovary) 14 cases, 7 survivals—50 per cent.

Class D (metastases to obturator and/or external iliac and/or common iliac and/or hypogastric nodes) 11 cases, 3 survivals—27 per cent.

Class E (bladder and/or rectal invasion or invasion of the ureters) 25 cases, 4 survivals—16 per cent.

Of the 104 patients (A to E) who were subjected to a major or surgical attempt at cure, 55 (53%) are 5 year survivors. The over-all surgical results in the total 162 patients is 39.5 per cent. It is of significance that more than one-third of the patients treated had recurrent disease.

The series does not represent purely a surgical endeavor. Usually preliminary transvaginal cone therapy was given and in a few cases the pelvic portals were treated. It is true that "cures" cannot be attributed to surgery alone. On the other hand, of 27 patients with a viable neoplasm limited to the cervix, who were or were not given adequate preoperative radiation, 23 (85%) survived 5 years, whereas of 16 patients who had received preoperation radiation designed to cure, but who had no viable carcinoma in the excised specimen, 13 (81%) survived 5 years. Although the numbers are small the author believes that previous irradiation with apparent destruction of the lesion does not appear to influence the outcome in a more favorable manner.

Among the surgical cases there were 4 major urinary tract complications, exclusive of bladder atony: 4 ureterovaginal fistulas, 3 vesicovaginal fistulas, 3 cases of inadvertent division of one ureter during operation, and 2 cases of late stenosis of both ureters necessitating bilateral cutaneous ureterostomies. In 5 instances of partial exenteration, fecal and rectal fistulas developed through the perineal wound.

There was no surgical mortality in the 73 patients who were subjected to radical panhysterectomy with lymph node excision, radical Schauta vaginal hysterectomy, or the classical Wertheim operation. Eight of the 31 patients (26%) who were subjected to partial or complete pelvic exenteration died within 30 days of operation and are considered surgical mortalities. On the basis of the entire series of 104 patients treated by adequate operative means, the surgical mortality was 8 per cent.

The author does not advocate surgery as the usual method of therapy for cancer of the cervix at this time. Radiation is still the standard method of choice with the surgical attack reserved for those centers with special facilities. Only in the future, when more cases have been evaluated, will it be possible to determine the proper place of surgery in the therapy of cervical carcinoma.

WARREN R. LANG, M.D.

Total Abdominal Hysterectomy. A Report on Technique and Experience with the Operation. HOWARD C. STEARNS. *Obst. & Gyn.*, 1953, 1: 437.

After a brief discussion of the reasons for and against total hysterectomy, the author describes in detail the steps of a technique he has found safe. He explains that it is a composite procedure, with features adapted from the operation as done by other men.

The results in 594 personal cases are as good as anyone could wish, with no deaths and few complications.

The illustrations are excellent and the operation as shown follows the standard and generally accepted pattern. The chief criticism of it lies in the observation that it is indeed too much of the standard pattern with broad bites of tissue and mass ligature of the pedicles. Although it may be impractical to perform hysterectomy with small instruments applied only to the blood vessels and secured with fine silk in the Halsted tradition, nevertheless, some happy middle road between this and the opposite extreme should be available to the surgeon who takes pride in the niceties of his technical performance. HOWARD ULFELDER, M.D.

ADNEXAL AND PERIUTERINE CONDITIONS

Myoma of the Fallopian Tube (Il mioma della tuba). L. D'INCERTI BONINI and A. CAMERA. *Riv. ital. gin.*, 1952, 35: 431.

A 36 year old patient, who had given birth to 1 child with the aid of forceps, had been suffering for about 6 months with a sense of weight in the lower abdomen and pains in the lumbar and left iliac regions. She also suffered from constipation. Palpation disclosed a firm suprapubic mass, the size of a 4 month pregnancy, and a smaller (walnut-sized) tumor to the left of the main mass. The main mass was restricted in its mobility and was somewhat painful to pressure. The smaller mass was also painful to pressure but was freely movable and evidently separated from the body of the uterus. The diagnosis at this time was massive myoma of the body of the uterus and a possible neoformation of the ovary (cystic or solid), or a pedunculated myoma of the uterus.

Treatment consisted of subtotal hysterectomy and left salpingo-ovariectomy. Histologic examination of the juxtauterine tubal neoplasm disclosed findings rather typical of myoma. The vortical distribution of the strands of smooth muscle fibers was present, as well as the paucity of the connective tissue stroma and the scarcity of blood supply. The tiny blood vessels appeared in many instances to be compressed by the tumor growth; only the thickened serous covering evidenced an abundant capillary blood supply. Passing toward the center of this tumor, the tumor tissue began to show regressive changes until, quite centrally, the fibers lost structure, the whole area assuming an appearance of hyalin substance. With the known propensities of

hyalin material to undergo calcification the authors do not doubt the claims of other authors with reference to the findings of calcific changes in these tumors; the authors themselves did not find any evidence of such change.

The tube itself was found on the surface of the tumor mass. It was evidently flattened and compressed. Its lumen was also flattened, relatively small, and almost without the plications of mucosa characteristic of the normal tubal lumen. The epithelial lining of the tubal lumen was cylindrical, monostratified, and fairly normal; however, the usual cilia were present only in scattered areas. The muscular coatings of the tube did not seem much reduced and appeared fairly normal. The muscular fibers on the surface were contained by the serosa; towards the tumor, however, the muscular fibers of the muscular strata of the tube passed over without interruption into the tissues of the neoplasm.

Fifty instances of this tumor have been reported. It develops most commonly between the thirtieth and fiftieth years of life, on the left side and in the juxtauterine portion of the fallopian tube, just as it did in the authors' case. As a rule, the lumen of the tube is near the tumor surface; however, instances have been reported in which the tumor tissue entirely surrounded the tube proper.

The authors consider the treatment of this neoplasm to be purely surgical; because of its mobility, if for no other reason, its treatment by irradiation would be impractical. Also, in view of its known tendency to form a pedicle and that of the pedicle to undergo torsion (volvulus), it would seem best to remove the tumor surgically as early as practicable. However, the surgical treatment should be extremely conservative, despite the reports of other authors of finding evidence of malignant degeneration in some tubal leiomyomas. A unilateral salpingo-ovariectomy is the most radical procedure to be considered; however, the condition of the uterus in the authors' patient forced them to do, in addition, a subtotal hysterectomy. JOHN W. BRENNAN, M.D.

EXTERNAL GENITALIA

Intraepithelial Carcinoma of the Vulva. SPRAGUE H. GARDINER, FRANCIS E. STOUT, J. L. ARBOGAST, and CARL P. HUBER. *Am. J. Obst.*, 1953, 65: 539.

One hundred and twelve cases of carcinoma of the vulva are reviewed in this article. In 2 of the cases, the intraepithelial phase persisted for 7 and 11 years, respectively, before invasion occurred. In 2 other cases there were large intraepithelial lesions with early central invasion. Four cases were grossly characteristic of invasive carcinoma, with microscopic evidence of intraepithelial carcinoma at the periphery of the invasive neoplasm.

The authors believe that it is reasonable to assume that invasive carcinoma of the vulva is preceded by an intraepithelial phase, which may be of long or short duration and is recognizable by clinical and microscopic study. ELY ELLIOTT LAZARUS, M.D.

Primary Carcinoma of the Vagina. Report of 46 Cases. MELVIN D. BIVENS. *Am. J. Obst.*, 1953, 65: 390.

In reviewing the admissions to the Gynecology Tumor Conference at the University of Michigan Hospital, Ann Arbor, from 1931 to 1951, 46 cases of primary carcinoma of the vagina were noted. This represented an incidence of 1.8 per cent of all malignancy of the reproductive tract seen at this clinic. For each case of primary carcinoma of the vagina admitted there were 44 carcinomas of the cervix, 5 of the ovary, and 3 of the vulva. The age limits of occurrence were 15 and 83 years. The mean age was 64 years. Two of the patients were not married, 5 were nulliparous, and 14 had 4 or more children. Menstruation had ceased prior to the onset of symptoms in 35 patients. The average age of spontaneous menopause was 51 years. Severe vaginal infections were found in 3 patients and these masked the clinical picture sufficiently to delay the diagnosis of carcinoma.

The initial symptom of painless vaginal bleeding was found in 67 per cent of the patients, leucorrhea in 17 per cent, a nodule in the vagina in 6.5 per cent, perineal pain in 6.5 per cent, and leg pain in 2.2 per cent. The average delay between the onset of symptoms and medical consultation was 5.7 months.

Forty-eight per cent of the lesions were in the upper third of the vagina and 21 involved the posterior vaginal wall. The lesions varied in size from 0.7 to 7.5 cm. in diameter. Classification of the tumor's gross appearance according to Healy revealed 28 per cent were everting, 54 per cent infiltrating, and 6.5 per cent were of the annular constricting type. Extravaginal extension of the tumor at the time of the initial examination was found in 40 of the 46 patients. The broad ligaments were involved in 19 cases, the rectovaginal septum in 7, the bladder in 5, the rectum in 4, the inguinal nodes in 3, the vulva in 1 case, and the ischium in 1. Distant bony metastasis were found in 4 cases.

Histological study indicated the presence of squamous cell carcinoma in 43 of the patients; 66.6 per cent of the lesions were graded as stage 3 or 4 malignancy, according to the degree of anaplasia. The other 3 patients had adenocarcinoma of the vagina.

The patients were treated with radium, x-rays alone, and x-rays in combination with surgery. There were 5 year cures in 27.5 per cent. When classified according to Courtial, there were survivals in 100 per cent of the cases in stage I, in 54 per cent of those in stage 2, while there were no survivals for 5 years among the cases in stage 3.

It was concluded that primary carcinoma of the lower third of the vagina should be treated with radical excision and lymphadenectomy as is done in carcinoma of the vulva. Lesions of the upper third of the vagina should be treated the same as cervical carcinoma. Inoperable patients should be treated with deep x-ray and radium therapy.

ARTHUR L. HASKINS, M.D.

MISCELLANEOUS

Action of the Ovarian Hormones on Uterine Muscle. GEORGE W. CORNER and ARPAD CSAPO. *Brit. M. J.*, 1953, 1: 687.

The authors review the experimental observations which led to their conclusions that (1) spontaneous contractions of uterine muscle depend upon the presence of a hormone (estrogen), (2) the pattern of spontaneous contractions is different if progesterone is also present, and (3) the response of uterine muscle to oxytocic drugs may differ under different hormone domination.

The authors summarize the work of Szent-Gyorgyi and others on the physical chemistry of skeletal muscle, and report the results of their own studies which demonstrate a basic identity between skeletal and uterine muscle physiology.

Finally, they describe their observations, based on experimental studies of the effects of estrogen and progesterone on uterine muscle contractions. They conclude that these two hormones alter myometrical function in opposite directions. During the course of the experiments they made the unexpected observation that the effect of these hormones on uterine muscle contractility may be mediated through alterations in the potassium balance of the cells.

HOWARD ULFELDER, M.D.

The Corpus Spongiosa of the Urethra: Its Possible Role in Urinary Control and Stress Incontinence in Women. SAMUEL GORDON BERKOW. *Am. J. Obst.*, 1953, 65: 346.

The most important elements in urinary control or the development of stress incontinence are the musculofascial sphincters. There is some disagreement as to the number, mechanism, and anatomy of these structures as indicated by the references of several authors to one or more sphincters and descriptions of diverse arrangements of the sphincters. Anatomical abnormalities of the structure of the urethra and bladder have also been indicted as other causes of stress incontinence. X-ray and cystometric studies have not revealed all in this regard according to the author and he postulates the presence of an "unknown factor in the mechanism of urinary control and/or stress incontinence."

The author believes that the overlooked element in urinary control is the venous network that lies between the urethral mucosa and its musculature. This has been called "a cavernous vascular submucosa, the erectile tissue or the corpus spongiosum of the urethra." The function of the urethral corpus spongiosa is likened to the function of the "washer" that is used to keep a faucet from leaking. This function, in addition to the properly acting sphincter, assures a watertight closure of the bladder.

To confirm the presence of these venous sinuses, fresh material was obtained from female cadavers. The veins were found to be markedly distensible and to form a corpus spongiosa composed of erectile tissue. The number of these veins exceeds the requirements of a blood supply for the urethra.

It was further postulated that the decreased turgidity of the corpus spongeosum found in postmenopausal women may be the cause for incontinence.

Stress incontinence may become greatly aggravated in those patients who have had antecedent injury to the sphincters of the urethra. This concept is supported by the fact that the administration of estrogen results in the prompt relief of postmenopausally developed stress incontinence.

The author submits these observations for critical appraisal, i.e., that the spongiosa is an added element in the mechanism of urinary control in the female and of stress incontinence of the urine.

ARTHUR L. HASKINS, M.D.

OBSTETRICS

PREGNANCY AND ITS COMPLICATIONS

Pre-Eclamptic Toxemia. Further Experience with Penicillin and Terramycin. GEORGE V. SMITH and OLIVE W. SMITH. *Obst. & Gyn.*, 1953, 1: 302.

This article describes the treatment of 5 patients with penicillin and terramycin as far as their effects on pre-eclampsia toxemia is concerned. The procedure followed was the accepted form of therapy for toxemia, plus the use of penicillin and terramycin, which were given only to those patients whose toxemia was becoming worse despite bed rest, dietary measures, sedatives, the intravenous use of glucose, and the use of magnesium sulfate or hypotensive drugs.

The most striking effects of these antibiotic drugs have been diuresis, reduction of the urinary protein, and relief of the symptoms. Hypertension has been less rapidly and less consistently reduced. Terramycin appears to be fully as effective as penicillin. It has been found that the diuresis which follows the administration of terramycin to toxemic patients is accompanied by an increased urinary output of sodium and potassium.

The beneficial effects of these antibiotics in toxemia appear to be due to neutralization or elimination of circulating toxin and they seem to be limited to the mother. Fetal salvage has not been improved. In the study of an additional patient it was found that the beneficial effects of penicillin upon the toxic signs, like those of terramycin, are also accompanied by an increased urinary output of sodium and potassium. HARRY FIELDS, M.D.

Acute Appendicitis During Pregnancy. J. GEORGE MEHARG and FREDERICK A. LOOP. *Obst & Gyn.*, 1953, 1: 460.

Acute appendicitis is an uncommon complication of pregnancy; however, it occurs with sufficient frequency and its consequences are of such serious portent that the obstetrician should always be alert for its possible presence. The incidence varies with the author. Cosgrove reported 18 cases in 25,000 live births, an incidence of 1 in 1,389. Smith and Bartlett reported 20 cases in 66,431 deliveries, a ratio of 1 to 3,322. The authors' incidence is more in agreement with that of Baer, Reis, and Arens who found 1 case of acute appendicitis among 591 deliveries, or 0.17 per cent.

Johnson found that 80 per cent of his cases of appendicitis in pregnancy occurred during the second trimester. Of the 28 cases reported by Baer and associates, 20 were in patients operated upon during the second and third trimesters of pregnancy. Twenty-two of the authors' patients were operated on during the first two trimesters of pregnancy. It is generally agreed that appendicitis during the last trimester is uncommon, and is rare near term.

Since both pregnancy and appendicitis are more common during early adult life, the finding of a high incidence of appendicitis in primigravida and secundipara who are less than 30 years of age is consistent.

The symptoms of appendicitis early in pregnancy are no different from those in the nonpregnant state. The history in the acute cases is fairly typical, with onset of upper abdominal pain gradually localizing to the right lower quadrant of the abdomen. Although Baer and his associates found that 86 per cent of their patients (50 per cent before pregnancy and 36 per cent during pregnancy) gave a history of preceding attacks, the importance of this observation could not be confirmed. Less than half (44 per cent) of this series had any history of previous attacks of pain or appendicitis. The anamnesis is important in the diagnosis of acute appendicitis in pregnancy, not only as to the character of the pain and other symptoms, but most significantly the duration of symptoms.

While pain is the most constant complaint, nausea and vomiting do occur; however, the latter may be confused with the nausea and vomiting of early pregnancy.

Of the physical signs, tenderness is the most constant and significant. It is usually most marked over McBurney's point and in the lower right quadrant of the abdomen. The authors did not find that upward displacement of the appendix concomitant with the advancing pregnancy was of much significance in diagnosis. Hyperesthesia, as reported, remained low over McBurney's point. Rigidity was found in only 3 patients.

Laboratory findings parallel those found in acute appendicitis in the nonpregnant. Leucocytosis is of little value in diagnosis, but granulocytosis of over 86 per cent is suggestive of acute appendicitis if associated with a leucocytosis of over 13,000 per c.cm. Fever is not a prominent diagnostic sign, but an increase in pulse rate has been reported to be of significance.

Urinalysis is helpful in a negative way in that one may rule out urinary-tract infections or other renal disease.

Differential diagnosis must exclude such obstetrical complications as abruptio placentae and tubal gestation. The symptoms of twisted ovarian cyst, salpingitis, or pedunculated leiomyofibromas are often similar to those of appendicitis. Pyelonephritis is the disease most frequently confused with appendicitis in pregnancy. It must always be considered since it frequently occurs on the right.

Appendicitis is a serious complication of pregnancy. Underwood reported a mortality of 29.7 per cent for cases of acute suppurative appendicitis in pregnancy. For all types of appendicitis in the third trimester of pregnancy, Marberry found the mor-

tality to be 26.4 per cent. McDonald quoted a 30 per cent mortality for cases complicated by peritonitis.

Advances in chemotherapy have contributed to lowering the mortality of this disease in recent years. Prognosis is largely dependent on the time interval between the onset of symptoms and the operation. Pregnancy, with the shift of the appendix from a pelvic to an abdominal organ, favors peritonitis, which is the most serious threat to the patient's recovery. The nearer to term, the more marked is the tendency toward generalized peritonitis, even in cases of appendicitis without perforation.

The reported incidence of abortion in early pregnancy complicated by appendicitis is not striking; however, 4 patients aborted. Near term, the onset of labor is said to follow closely on the heels of the operation. This was the case in the one patient who was operated on near term.

The treatment of acute appendicitis in pregnancy is always surgical. The longer the delay in operation, the more serious are the complications and prognosis. In the presence of perforation or peritonitis, drainage has been advocated. Experience with drainage has not been wide, but suggests that it may be of questionable value.

Management of the pregnancy should be conservative. Cesarean section and cesarean hysterectomy have been recommended along with appendectomy, particularly in cases of peritonitis. Unless sound obstetric indication exists for these procedures, they are to be condemned. Labor does not interfere with the healing of the incision. Pain from the incision is of minor consequence during the labor. Prophylactic outlet-forceps delivery is advisable to shorten the second stage of labor in these patients. The patient who went into labor on her third postoperative day was delivered in this manner, much to the satisfaction of both the patient and the attending physician. Spontaneous delivery has been shown to be both feasible and safe. CHARLES BARON, M.D.

The Causes of Placenta Previa (Ueber Ursachen der Placenta praevia). COLMEIRO LAFORET. *Geburtsh & Frauenh.*, 1953, 13: 150.

The reasons for low insertion of the placenta are manifold, a fact that makes it difficult to determine its cause. One can, however, distinguish two different and fundamental types of the condition.

In one group anomalies are found in the ovum, while in the other they are found in the uterus. The latter group is of greater practical importance. Clinical observations show that the incidence of placenta previa is higher among multiparas; previous curettages, faulty involution of the uterus, and postpartum inflammation, as well as chronic inflammatory processes, according to Strassman, are responsible for a mucosa that is inadequate for nidation. Therefore, in order to obtain adequate contact with the maternal tissue, the placenta grows larger for better surface contact.

Experimentally, it can be shown that after damage to the uterine horns in rabbits, only a rudimentary development of decidua takes place in this region and that nidation of the egg occurs in the lower field of the uterus.

It is common knowledge that in placenta previa the placenta is larger than the normal placenta. Studies were undertaken for the collection of data as to size and location of placentas in normal deliveries, spontaneous deliveries with low insertion of the placentas, and in cesarean sections for placenta previa. Immediately after delivery, all of the placentas were spread on a glass platter with the maternal face to the glass surface. The outlines were drawn with a dermograph and the drawings were transported from the glass to graph paper.

In 200 cases of normal placental insertion, the placentas averaged 311 sq.cm. in size, in 50 cases of low insertion, the placentas were 359 sq.cm. in size, and in 40 cases of placenta previa, the size of the placentas was 586 sq.cm. Therefore, it can clearly be seen that the placentas in placenta previa have a larger surface, but this observation does not give any information as to the cause of the anomaly, nor can the question whether the increased size is due to low insertion alone be answered.

In analyzing the last group it was found that 25 (60%) of the placentas were anteriorly inserted, 13 (30%) were posteriorly inserted, and in 2 cases the placenta was found to be laterally inserted.

It is concluded that insertion into the anterior uterus wall and a larger than normal circumference of the placenta are contributing factors to the development of placenta previa. OTTO WEISS, M.D.

Infectious Diseases in Pregnancy and Fetal Malformations (Malattie infettive in gravidanza e malformazioni fetali). Q. PADOVAN. *Riv. ital. gin.*, 1952, 35: 450.

Fifty-eight instances of infectious disease in women during various periods of pregnancy were investigated. This material was selected from a total of 16,335 labors occurring in the Obstetrical School of Ferrara, Italy, from January 1, 1941 up to December 31, 1950. Included were 18 cases of typhoid fever, 9 of Malta fever, 11 of toxic infectious jaundice, 13 of malaria, 4 of paratyphus B, 2 of diphtheria, and 1 case of scarlet fever.

Typhoid was found to produce abortion or premature delivery in more than half of the pregnancies which it complicated. More or less severe organic or functional debility was found in the surviving children from the typhoid mothers; there were 3 instances of deficient somatic development. Among the nervous disturbances there was 1 instance of rhythmic movements of the right hand associated with a vague, meaningless smile; there was also 1 instance of delay in teething.

In the 9 instances of Malta fever complicating pregnancy, interruption of the gravid condition occurred in more than half of the cases; this was especially apt to develop when the affection arose dur-

ing the first half of the pregnant period. Among the infants which survived there was an instance of mongolism, an instance of deficient somatic development and of stammering, an instance of mental deficiency, an instance of nystagmus in the horizontal direction with fixation, and, finally, an instance of myopia and dental defects.

In all of the 11 instances of infectious icterus premature delivery occurred. Among the premature children which survived, there was 1 instance of opacity of the left eye with bilateral myopia and speech difficulty, and another instance of retarded speech and retarded ambulation.

These three affections were the only etiologically significant gravid complications. The others showed no significant etiological relationship between the infectious complication of pregnancy and the amount of embryopathy.

In the second aspect of the author's study, the methods of research adopted by Spoto (*Surg. Gyn. Obst., Internat. Abstr. Surg.*, 1949, 88: 517; *Minerva gin.*, 1950, 6: 217) were followed faithfully. This portion of the author's material consisted of 137 fetal malformations occurring among 10,761 labors in the period from January 1, 1941 to December 31, 1950. In these the attempt was made (difficult though it was) to follow the case history back to the mother's period of pregnancy, in the hope of uncovering something which might aid in explaining, in an etiological sense, the development of the malformation. Such etiological relationship was uncovered in the form of polyhydramnion, heredity, toxicosis of pregnancy, and, in particular (given the increase in malformations of the fetus during the war and postwar periods), the influence of alimentation of the pregnant woman.

The author concludes that on the basis of his findings the damaging effects of the infectious diseases contracted during the period of pregnancy on the embryo in the course of its organization are expressed in the main as an organic fragility, particularly of the nervous system, but never of the genital apparatus, of the fetus. JOHN W. BRENNAN, M.D.

LABOR AND ITS COMPLICATIONS

Pure Nitrous Oxide During Labor. ARNE KINCH. *Acta obst. gyn. scand.*, 1952, 32: Supp. 2.

The aim of this work is to study the changes in the concentration of the blood gases when pure nitrous oxide is administered as a pain-relieving agent during labor and delivery. For this purpose 3 to 5 liters of pure nitrous oxide were administered intermittently to 196 parturient women. The obtained values were then related to a controlled group of 61 parturient women not given nitrous oxide. Three, 4, and 5 liters of nitrous oxide were inhaled during 30, 35, and 40 seconds on an average, respectively. As a rule, an inhalation was made in connection with each pain; that is, there were about 15 to 20 inhalations per hour and they continued for 2 to 4 hours. As a safeguard there was a charging period of 60, 80, and 100 seconds, respectively, for the different amounts of gas. During this period no gas could be inhaled.

The following investigations were made:

1. Quantitative estimations of the concentration of carbon dioxide, oxygen, and nitrous oxide in the venous and arterial blood.

2. Quantitative estimations of the concentration of carbon dioxide and oxygen in the umbilical blood when the mother was given pure nitrous oxide during the last period of the second stage of labor and the last inhalation of the gas coincided with the expulsion of the infant.

3. An estimation of the relative oxygen saturation in the arterial blood in conjunction with 3 consecutive inhalation periods with minimal intervals.

4. Quantitative estimations of the oxygen content in the umbilical blood when oxygen was given to the mother in conjunction with the birth of the infant.

The results were as follows:

1. In conjunction with a single nitrous oxide inhalation period the carbon dioxide concentration in the venous blood showed a gradual decline from the beginning of the inhalation period until the end of the charging period, while in the arterial blood the depression persisted for as little as 15 to 20 seconds after the end of the inhalation period and seemed to be compensated by the end of the charging period. The longer the nitrous oxide administration time, the lower was the carbon dioxide concentration in the venous blood, the initial value becoming progressively lower. In the arterial blood there was no similar change in the concentration of carbon dioxide, even when the administration had continued for 2 hours.

2. The end of an inhalation period of nitrous oxide is marked by brief arterial hypoxia. In the venous blood, a lack of oxygen was not demonstrated in conjunction with the inhalation of pure nitrous oxide. The oxygen lack in the arteries was apparently compensated within 15 to 20 seconds after the end of the inhalation period and showed no appreciable increase after longer administration or greater nitrous oxide volume.

3. In the venous blood the content of nitrous oxide following a single dose tended to increase during the inhalation period of the gas and the first 15 seconds thereafter. If nitrous oxide was intermittently administered for 2 hours or more, its concentration in the venous blood differed significantly from the corresponding observations for the first inhalation period. Prolongation of the administration time from 2 to 4 hours, however, had no significant effect. In the arterial blood, on the administration of 3 or 4 liters of nitrous oxide per inhalation period of 2 hours, the concentration rose quickly during the inhalation period and the maximum was attained at the same time that the inhalation period came to an end, the maximum for 4 liters exceeding that for 3 liters. Immediately when the inhalation of gas had stopped, the concentration in the arterial blood rapidly declined.

4. The nitrous oxide level in the arterial and venous blood at the beginning of an inhalation period after some hours' administration is about 1 volume per cent. In other words, the amount of nitrous oxide absorbed is not fully exhaled within the 3 or 4 minutes which usually elapse between two consecutive pains.

These investigations clearly demonstrate that the slight hypoxia observed plays no role whatever, provided that the administered amount of nitrous oxide does not exceed 5 liters and that there is a certain minimal interval between the inhalations. This interval must be 60 seconds for 3 liters, 80 seconds for 4 liters, and 100 seconds for 5 liters.

The concentration of carbon dioxide, probably due to the hyperventilation of the mother during delivery, was somewhat lower in the maternal venous blood and the concentration of oxygen somewhat higher as compared to the umbilical blood. No hypoxia could be demonstrated in the blood in the umbilical vein immediately after the mother had inhaled nitrous oxide. The results imply that under the conditions described the administration of pure nitrous oxide does not hurt healthy infants.

Pure oxygen administered to the mother during the last 15 to 35 minutes of labor will give rise to a marked increase of the oxygen content in the cord blood. If, on the other hand, oxygen is given after birth, but before the cord is cut, no oxygen will be transferred from the mother to the child.

HARRY FIELDS, M.D.

Release of Anticoagulant During Shock of Experimental Meconium Embolism. CHARLES L. SCHNEIDER. *Am. J. Obst.*, 1953, 65: 245.

The amniotic fluid embolism syndrome when occurring in human beings is frequently associated with a hemorrhagic tendency after shock occurs. It has been shown that the blood may become incoagulable after the amniotic fluid embolism. The author has shown that a similar situation can be obtained in the laboratory following the injection of meconium in the test animal. To study this phenomena under controlled conditions a number of animals were injected.

The method used consisted of anesthetizing dogs with nembutal. Meconium was obtained from newborn infants and was suspended in saline solution. Sublethal, lethal, and supralethal doses of the suspension were then injected into the animals. Several blood determinations were then carried out on the venous blood collected from the animals before and after the injection. Those recorded consist of the coagulation time, fibrinogen, prothrombin, toluidine blue titer, AC globulin, and platelet counts.

When lethal doses of meconium were administered the animals responded with shock and soon died. The coagulation time of the blood was usually greater than 20 hours. The platelets decreased in number to about 1 per cent of the preinjection level. Fibrinogen, prothrombin, and AC globulin remained in their normal concentrations. Sublethal doses of meconium produced a less severe clinical response. The platelet level decreased but not as markedly as in the lethal dose group. There was no change in the fibrinogen, prothrombin and AC globulin concentration. Incoagulability usually developed slower following the sublethal injection and coagulation usually returned to normal in 2 hours after injection. Protamine and toluidine blue titrations increased in both groups. Unusually large doses (supralethal) revealed a variable effect upon the coagulation mechanism. The platelets almost entirely disappeared. Death occurred in some experimental animals in this group without antecedent shock. A comparison was made between the effect of the injection of meconium and that of the injection of peptone. The former was found to be about 10 times as effective in producing incoagulability of the circulating blood as the latter.

These experiments show that the incoagulability of the blood that appears after meconium embolism is due to the presence of a powerful anticoagulant which is released into the circulation. This is heparinlike and is considered to be released into the blood during shock. Such an anticoagulant might play an important role in the obstetrical hemorrhage that sometimes appears to be a complication of amniotic fluid embolism. The role played by the thrombocytopenia was considered to be insufficient to render the blood incoagulable.

ARTHUR L. HASKINS, M.D.

NEWBORN

Kernicterus and Prematurity. A. D. T. GOVAN and JEAN M. SCOTT. *Lancet*, Lond., 1953, 244: 611.

The authors describe 10 cases of kernicterus in premature infants. In no case was there any evidence of blood group incompatibility between the mother and child. This is in contrast to the present day view that kernicterus is always associated with icterus gravis neonatorum resulting from hemolytic disease of the newborn.

The average birth weight of the babies was 3 pounds, and the average duration of pregnancy 32 weeks. Jaundice appeared usually on the fourth day. The time of death varied from the fourth to the ninth day. Autopsy was done in every case.

The brain lesions found resembled erythroblastotic kernicterus both in anatomical location and histologic appearance. Since similar lesions have been noted in premature infants dying during the first 3 days of neonatal life before jaundice appeared, it is probable that pigmentation of the lesions is a secondary feature. Children with kernicterus of erythroblastotic origin are usually mature with jaundice as an early occurrence before the fourth day. Death usually occurs within the first 48 hours.

From a comparison of the lesions found in known states of asphyxia the authors conclude that brain damage occurs at the time of birth and is due to anoxia. The lesions of erythroblastosis are thought to be of similar origin. WARREN R. LANG, M.D.

MISCELLANEOUS

The Obstetrical Future of Hypertensive Women Following Dorsolumbar Sympathectomy (L'avenir obstétrical des femmes hypertendues ayant subi une sympathectomie dorso-lombaire). P. MILLIEZ and D. FRITEL. *Presse méd.*, 1953, 61: 227.

The authors summarize the obstetrical histories of 4 patients before and after the performance of dorsolumbar sympathectomy for severe hypertensive disease. Of 15 pregnancies seen prior to surgery, only 3 terminated with the delivery of living infants. Toxemia was a frequent complication of the abortions, and of the premature births or term stillbirths.

Following surgery each patient had a single pregnancy, terminated by delivery of a living normal child. The pregnancies occurred between the sixth month and 2 years following sympathectomy. In 3 of the 4 pregnancies the blood pressure values rose above the postoperative levels. There was no evidence of toxemia in any of the patients. In all of the cases a low salt regimen was followed. Two of the patients received stilbestrol.

The performance of sympathectomy is described in 1 patient who presented evidence of severe deterioration during pregnancy as a result of hypertensive disease. The patient had refused therapeutic abortion. Following surgery her hypertensive disease stabilized and she was carried to term without further difficulty. Generally, when sympathectomy is indicated it should be performed prior to pregnancy and not during it. If pregnancy is desired after surgery, it should occur as soon as possible.

GEORGE C. LEWIS, JR., M.D.

New Facts Concerning Chorioepithelioma of Pregnancy — Trophoblastoma of Pregnancy — and the Study of the Malignancy Factors (Faits nouveaux concernant de chorio-épithéliome gravidique [trophoblastome gravidique] et l'etude des facteurs de la malignité). H. HINGLAIS and M. HINGLAIS. *Sem. hôp. Paris*, 1953, 29: 334.

Serial determinations of prolan B levels in the serum and urine are invaluable in the evaluation of moles and "malignant" chorioepithelioma. These studies have revealed findings which suggest that trophoblastic tissue from moles may frequently spread beyond the uterus and that metastatic chorioepithelioma may completely regress after removal of the uterus.

To support the first findings, 4 cases are described in which hysterectomy was performed for removal of a mole. Serial prolan B determinations revealed persistence of the hormone from 2 to 15 weeks after surgery. Because of this it was concluded that there must have been benign metastatic trophoblast tissue producing prolan B after removal of the primary lesion. The gradual destruction of this tissue by the patients' normal tissues was presumed to account for the eventual disappearance of prolan B.

The hormone levels in a case of evacuated mole are compared with those in a case of a "malignant" chorioepithelioma treated by hysterectomy. In both cases the prolan B gradually decreased in quantity to 0 in from 9 to 11 weeks. The gradual fall in value in the case of the chorioepithelioma was interpreted as evidence that there was a spontaneous disappearance of the metastatic lesions. Evidence upon which the diagnosis of malignancy was made is not described.

GEORGE C. LEWIS, JR., M.D.

GENITOURINARY SURGERY

ADRENAL, KIDNEY, AND URETER

The Behavior of the Stroma of the Suprarenal Gland in Hypertrophy Due to Adenoma of the Prostate Gland (Il compartamento dello stroma del surrene nell'ipertrofia prostatica adenomatosa). EUGENIO LINO. *Arch. ital. urol.*, 1953, 26: 33.

Twelve cadavers of persons who had died of causes independent of their prostatic hypertrophy furnished the material for this study. These persons at the time of their death ranged from 55 to 75 years of age. The suprarenal glands were fixed and stained by the methods of van Gieson, and Mallory-Agan, and the reticular tissues in general and the elastic fibers in particular were studied by the method of Achucarro-Rio-Hortega as modified by Allara. With this method the collagen fibers were colored yellow and the fibers of the reticular tissue, black (argyrophilia).

It is an established fact that the stroma (capsule and interstitial supportive connective tissue) of the suprarenal gland contains a preponderance of reticular tissue before the fiftieth year of life, while in later years of life the amount of collagenous tissue increases. This same transformation has also been observed in other organs (thymus, breast, thyroid, prostate). However, in these 12 instances of prostatic hypertrophy, although the author's stained sections did not show changes so marked in character that they could be considered pathognomonic for prostatic adenomatosis, an abnormal amount of reticular tissue for these later periods of life was encountered. The capsule, it is true, had undergone the typical sclerosis of senescence, but the interstitial connective tissue supports were still largely made up of reticular tissue, particularly about the blood vessels. There were few elastic fibers in the capsule anywhere; however, in the interstitial supportive tissues, particularly in the medulla of the gland and about the blood vessels, the strongly argyrophile (elastic) fibers were in abundance. At times the fibers of the reticular tissue were extremely fine (as though newly formed) and at other times a part of the fiber would be strongly argyrophile and the rest would show the yellowish staining qualities of collagen.

These findings caused the author to conclude that the collagenous hyperplasia of senescence is largely derived from metaplasia of the reticular component, and that the persistence of the reticular tissues in the suprarenal glands indicates a persistence of the functional activity of these organs.

JOHN W. BRENNAN, M.D.

Subtotal Adrenalectomy for Cushing's Syndrome. WALTMAN WALTERS. *Arch. Surg.*, 1953, 66: 244.

Experiences concerning 46 cases in which subtotal adrenalectomy was performed for Cushing's syndrome at the Mayo Clinic are reviewed and discussed. The author mentions a case from 1924 in which removal of carcinoma of the adrenal was done with death due to adrenal insufficiency, and leads up to the observation in 1933 that Cushing's syndrome can occur in the absence of tumor of the adrenal gland, but the adrenal glands must be hyperplastic. The first description of the "suprarenal cortex syndrome" was reported from the Mayo Clinic in 1934, and in this the next step was adrenal resection, and then later, total adrenalectomy.

The first 29 cases of subtotal adrenalectomy were presented in 1951 with 6 deaths, and since January, 1951 there have been 17 additional patients who were operated on with but 1 mortality. Nineteen of the original 29 cases presented excellent results so far. Three patients had recurrences of the signs and symptoms of Cushing's syndrome, and in 1 of these the remainder of the adrenal gland was removed elsewhere with excellent remission and the patient is on cortisone replacement therapy.

Subtotal adrenalectomy will be continued in these cases until adequate follow up can be made for further evaluation of the procedure.

Some of the laboratory results in these cases have been reduction in the excretion of 17 ketosteroids in 15 of the 17 cases, and reduction in the urine corticosteroids in 11 of 12 cases. It is re-emphasized that constant clinical and chemical surveillance is a necessity in the postoperative stabilizing period and also in any surgical emergency following subtotal adrenalectomy.

The preoperative and postoperative care is discussed. Cortisone therapy has been used in the last 25 cases, 200 mgm. of cortisone usually being given intramuscularly 48 and 24 hours before the operation and on the morning of operation. The immediate shocklike reaction has usually been averted. At present 90 per cent of one adrenal gland and 100 per cent of the other is removed for the best results. A one-stage operation was done successfully on 1 occasion and will be attempted again in the future.

One patient with metastatic carcinoma of the breast was subjected to total adrenalectomy with good results in the short term follow-up period.

JOHN R. HERMAN, M.D.

Study of the Histologic Lesions and of the Pathogenesis of the "Hibernating Kidney" (Contributo allo studio delle lesioni istologiche e della patogenesi del "rene ibernante"). BRUNO TERRUZZI. *Arch. ital. urol.*, 1953, 26, 3.

Macroscopic and microscopic anatomopathologic studies of hibernating kidney, with microphotographic reproductions have, in the author's knowledge, not as yet been published. During the past 2 years, the author's superior, Pisani, removed a non-

functioning kidney for another indication in each of 2 patients. The anatomopathologic findings in these two organs, with 13 microphotographic reproductions, are here reported.

In the first kidney examined the kidney tissue appeared to be notably altered. There was an increase of connective tissue in the cortex and in the limiting zone between the cortex and the medulla. These changes were more pronounced as the capsule was approached and also in the environs of the larger blood vessels. The parenchymatous tissues and functional elements of the kidney also presented notable changes. The glomeruli were also involved in the sclerotic change. There was thickening of the capsule of Bowmann with a tendency toward obliteration of the glomerulus itself. Not all of the glomeruli were thus affected, and the author is of the opinion that these relatively unaffected vascular tufts are capable (by means of a vicarious functional effect) of accounting for some of the "complete recoveries" which have been reported in the literature. In some areas the sclerosis seemed to have progressed to the point of hyaline degeneration. The tubular elements also seemed to have suffered injury. The convoluted tubules and the loops of Henle in places showed evidence of turbid swelling and even of lysis of the epithelium.

In the second kidney the changes were much like those in the first, except that the changes were more prominent in the immediate vicinity of the renal capsule. Here there was a proliferation of the intima of the blood capillaries, leading in places to complete obliteration. Here also was a very marked turbid swelling of the convoluted tubules and of the loops of Henle. Finally, here again, just as in the first kidney examined, some of the glomeruli appeared to be fully functional, while intermingled were glomeruli which appeared to be empty, or semi-empty, of blood and filled with desquamated cellular elements.

In these patients the absence of renal colic for the entire duration of the syndrome and the absence of dilatation of the excretory cavities of the kidney led to the belief that there was still present a modicum of secretory activity (nephrography), and the absence of excretion of urine into the bladder was accounted for on the basis of a re-absorption of pyelovenous nature, rather than on the basis of an obstructive lesion (absence of colic and of dilatation).

Thus, the author accepts the hypothesis of Musciani and of Wolfromm (based on the studies of Trueta), that the causative factor is a peripheral vasoconstriction of the interlobar arteries with resultant ischemia of the cortical tissues, the arterial blood being in large part short-circuited in the medullary area, with only sufficient circulation to maintain the vitality of the cortical renal tissues. This vitality is retained for only a few months and, if the condition continues long enough, the described irreversible changes appear and may eventually progress to complete destruction of the functional capacity of the organ.

The author does not accept the assertions of Chauvin, that the syndrome may last for as long as 10 years with ultimate recovery of the organ.

JOHN W. BRENNAN, M.D.

Operations on Solitary Kidneys (Operationen an Einzelnieren). H. MEUSER. *Zschr. Urol.*, 1953, 46: 66.

The author presents 41 cases of solitary kidney dating back to 1926. Operative indications in cases of solitary kidney are different than if two kidneys are present; nephrotomy will be avoided as much as possible because of late hemorrhage; however, nephrostomy may be quite important. The cases are divided into the following groups: (1) congenital solitary kidney (2 cases); (2) "anatomical solitary kidney" when the other kidney was removed (21 cases); (3) "functional solitary kidney" when the other kidney did not function but was later removed (15 cases); (4) "functional solitary kidney" when the other kidney did not function and was not removed (3 cases).

Congenital solitary kidneys were observed 12 times among 18,123 autopsies; they tend to be more susceptible to disease than normal bilateral kidneys. Among 267 congenital solitary kidneys, Winter found that 64 (27%) were diseased. Adrian and V. Lichtenberg are quoted as stating that the congenital solitary kidney becomes diseased in 38 per cent of cases, and Graser is cited as having observed that one-half of the congenital solitary kidneys among 116 autopsies were diseased.

The 2 patients in group I had pyelotomies for removal of calculi. In group II there were cases of renal and ureteral calculi, tuberculosis, hydronephroses, pyonephroses, and pyelonephritic contracted kidneys. Similar cases form the basis of groups III and IV, but one exceptional case is that of a calcified hypernephroma of the right kidney (confirmed histologically by biopsy), combined with a hydronephrosis of the left kidney. Decapsulation and deep x-ray therapy of the tumor-bearing kidney was carried out, while the other kidney was not explored. The patient lived 2 years after this procedure and his initial hematuria ceased.

Although the body adjusts to the loss of one kidney, there is experimental evidence that nephrectomized animals are less resistant to intravenous injection of normal, uremic, or septic urine than animals which have both kidneys intact. It is believed that the morbidity in the acquired solitary kidney is increased just as it is in the congenital solitary kidney; however, the functional adjustment of the remaining kidney occurs within from 24 hours to 6 days. Bearers of acquired solitary kidneys are fully capable of work; the condition is compatible with pregnancy, as reported by Prather and Granville who presented 365 pregnancies among 296 women with solitary kidneys. However, caution should be exercised, not only in the treatment but also in the examination of solitary kidneys; instrumentation is to be avoided and the usual tests in

combination with intravenous urography will provide enough information. Should there be an indication for retrograde exploration, the author prefers pyeloscopy to pyelography.

The operative mortality reported in the literature was as high as 30 per cent; however, there are lesser figures, viz., Walters reports a mortality of 14 per cent among 43 cases; Pinsani, 15 per cent among 33 cases; Rizvach, 23.25 per cent in septic cases and 2.9 per cent in aseptic cases; Mathe, 7.7 per cent in 13 cases; and the author reports 9.7 per cent among his 41 cases. Sepsis was the cause of death in 2 of the author's cases, bilateral pleural empyema was the cause in 1 case, and pulmonary embolism in 1 case.

The author also discusses some characteristic disease entities and their management:

Hydronephrosis. Pyeloplasty or simple fixation by nephropexy is believed to be satisfactory. If aberrant vessels are present it is preferred to alter the course of the kidney pelvis rather than to resect the vessel. If the cause of the hydronephrosis is in the lowermost part of the ureter and cannot be corrected, nephrostomy is the operation of choice.

Renal calculi. Small calyceal stones without infection remain undisturbed; the same calculi with infection deserve careful observation for growth, and occasionally for operation. Small, mobile, noninfected calculi should be removed because of the danger of blocking; operation is imperative when infection is present. Large noninfected calculi are observed over a 6 months' period unless they grow rapidly or cause retention. If infection is present such calculi should be removed before they become staghorn-like. Complete removal of staghorn calculi is uncertain and recurrences, especially with infection, are frequent. For that reason their operative treatment is not favored, but rather a nephrostomy is preferred. Staphylococcus calculi should be removed, especially with the modern support of antibiotics. If calculosis is due to hyperparathyroidism, the condition should be corrected prior to the removal of calculi in order to prevent recurrence. The complete removal of calculi is emphasized, and a double barrel nephrostomy for continuous irrigation with Suby's solution G is recommended.

Ureteral calculi. Small, noninfected calculi are treated conservatively and ureteral manipulation should be reserved only for cases of anuria or acute blocking. (According to experiments, a kidney is said to recover completely after an occlusion from 2 to 4 days, but recovers incompletely after an occlusion lasting 7 to 14 days, and not at all if the block lasted 21 days). Occasionally the Zeiss loop (similar to the Ellik loop) is useful. Small infected stones must be treated aggressively with either ureteral catheterization, or by operation in the presence of retention or fever. If the stones are larger and infected, operation is indicated. In the presence of chill and fever a decompression of the kidney by nephrostomy and decapsulation, with or without removal of the stone, is recommended.

Anuria. This condition requires decapsulation and nephrostomy 24 hours after onset in febrile cases and 48 hours after onset in noninfected cases. Until then, conservative means such as ureteral catheterization, paravertebral sympathetic blocks, intravenous novocain, or sodium sulfate may be tried. The author has used supporting peritoneal lavage combined with high doses of intravenous Ringer's solution (500-1,000 ml/hr).

Tuberculosis. This condition can obviously be treated only conservatively if it is present in a solitary kidney, although partial resection has been reported.

Tumor. Partial resection is not promising although it was done by the author in a patient who had two kidneys; therefore, conservative treatment (roentgen therapy) has been tried.

Polycystic kidneys. Treatment by ignipuncture can prolong the patient's life.

Paranephritic abscesses. These abscesses must be incised as soon as the diagnosis is made.

ERNEST BORS, M.D.

Solitary Renal Cysts. CHARLES H. DE T. SHIVERS and HERBERT D. AXILROD. *J. Urol.*, Balt., 1953, 69: 193.

True solitary cysts are generally found in the renal cortex. The cyst wall is composed of fibrous tissue lined with a single layer of flat endothelium. The cysts usually contain a simple serous fluid. The hemorrhagic cyst is often associated with renal neoplasm, in approximately 30 per cent of cases. The cause is undetermined. There are two theories, one that the condition is congenital in origin, on the same basis that is used to explain polycystic disease, and the other that the condition is acquired and obstruction to the tubule is the primary causative factor. There is no definite pattern of symptoms, which are largely secondary to pressure.

The authors present 3 cases in detail which were treated by excision and carbolization, and closure if possible. Of the 3 only 1 had significant subjective symptoms. There was no obliteration of the calyces nor deformity of the true renal pelvis so commonly seen in tumor of the renal parenchyma. The pyelograms showed principally deformity, consisting of dilatation, displacement, or flattening of the calyces. Postoperative pyelograms revealed a return to normal following the surgical procedure.

ROBERT O. BEADLES, M.D.

Hypotheses and Research with Reference to the Functioning of the Artificial Kidney (Ipotesi e ricerche sul funzionamento del rene artificiale). MICHELANGELO SORRENTINO. *Urologia*, Treviso, 1952, 19: 508.

The artificial kidney constructed by the author, of the open circuit type, was intended originally to remove from the blood stream, by a process of dialysis, the toxic substance, or substances, responsible for the clinical picture of acute uremia. The beneficial effects which the author noted in his work were at first ascribed to the removal by dialysis of

the antidiuretic hormone, adiuretine (ADH). However, the small amounts of blood actually dialysed in his material (never more than one-half liter) did not explain the amount of improvement noted in the condition of the patients with oligouria or anuria of acute nephritis, and he was forced to consider other possible effects from the use of the artificial kidney.

One possibility was the inactivation of the toxic factor by ultraviolet radiations, as the author had been subjecting the blood to irradiation before passing it through the dialyzation process. Of course if irradiation was the effective process then perhaps as good a result would have been obtained by simply withdrawing the blood and irradiating it, or even just re-injecting it after a period of an hour or so (auto hemotransfusion). This was done in 21 patients. The re-injection proved harmless; however, the material on which this had been practiced was not favorable for treatment; it consisted mostly of instances of prostatic adenoma with retention or of contracted kidney, while the most favorably affected condition was that of acute nephritis. Nevertheless, in these patients there was always a moderate lowering of the azotemia after a few hours, or an initial increase in the uremic manifestations, followed by a mild diminution.

Another possibility was that the irradiation might result in an increase of the alkali reserve of the blood, as it is known that the uremic symptoms become worse as the alkali reserve is lowered. However, the oxygenation of the blood in the open system may also play a role, as it is known that the supplementation of oxygen tends to produce an increase in the alkali reserve.

A final possibility resided in the fact that the uremia might constitute a manifestation of an allergic state; in fact, the author was of the opinion that recent research tends to point more and more in the direction of an allergy. Thus, the re-injection of the blood, or even the presence of an anticoagulant (heparin, sodium citrate), may produce a slight anaphylactic reaction which tends to modify or suppress the main anaphylactic manifestation constituting the uremia itself.

At present electrophoretic properties of the proteins are being studied with the Tiselius apparatus in the hope of casting some light upon the modus operandi of the artificial kidney.

JOHN W. BRENNAN, M.D.

Idiopathic Segmental Ureteral Ectasia in a Congenital Solitary Kidney. JOSEPH A. LAZARUS and MARIO W. RICCI. *J. Urol.*, Balt., 1953, 69: 222.

Idiopathic megaloureter is of two types: (1) the ureter alone is ectatic and the renal pelvis is normal, and (2) the ureter and renal pelvis are involved and there is absence of peristalsis which permits free reflux from the bladder to the renal pelvis. There is no satisfactory explanation of this condition.

Symptoms, if present, are usually caused by superimposed infection or obstruction with impairment of drainage. Diagnosis is made by urography.

Treatment is indicated only in the presence of symptoms. Antibiotics and catheter drainage will usually suffice. If surgery becomes necessary, nephroureterectomy is the procedure of choice if the condition is unilateral and the remaining kidney normal. Patients with bilateral involvement or with a lesion in a solitary kidney may require some type of diversion procedure.

The authors describe this condition in a patient with a congenital solitary kidney which was successfully treated by ureteroplasty.

ROBERT O. BEADLES, M.D.

Reimplantation of the Ureter. D. ST. CLAIR L. HENDERSON. *Brit. J. Urol.*, 1953, 25: 3.

Seventy-three cases of reimplantation of the ureter are reviewed. In 67 of these the reimplantation was done at the time of partial cystectomy. There was a mortality rate of 4.1 per cent. In almost all of the cases the ureter was brought directly into the bladder. It was slit and secured with fine chromic sutures to the margins of a stab wound or to the edges of the line of excision in cases of segmental resection. No splinting catheter was used, nor were any extravesical sutures placed.

Patients with reimplanted ureters were followed by cystoscopy, bacteriological examination of the urine, intravenous urography, and cystography. In the latter study, films were taken with the bladder full and at micturition. Twenty-five of 38 patients examined showed infected urine on culture. On intravenous pyelography, 29 of 42 cases were said to show good function. There was no function in 3 cases. It seemed that function decreased with time. The outline showed hydronephrosis in 3 cases, evidence of chronic pyelonephritis in 10, and changes indicative of chronic infection in its early stage in 9 cases. Among 31 patients examined by cystography, there was immediate reflux in 22; all but 3 of the remaining patients showed reflux on straining or at micturition. The author suggests that delayed reflux is indicative of ureteral stricture. In this series there was no pain noted in association with reflux.

JOHN T. GRAYHACK, M.D.

BLADDER, URETHRA, AND PENIS

Potential Errors in Total Cystectomy—A Plea for Conservatism. E. VINCENT MOORE and GERALD HOWE. *J. Urol.*, Balt., 1953, 69: 390.

Cystoprostatectomy is riding on the crest of a wave of enthusiasm and the authors present 4 cases in an attempt to show that transurethral resection is often adequate therapy and obviates the radical surgery. "Total extirpation, while sound in theory, has failed to cure many bladder cancers," and survivors of the procedure too often have had severe disability incident to cloaca creation.

The authors present 4 case reports illustrating the cure of advanced vesical malignancy with the resectoscope. Three of the patients were subjected to total cystoprostatectomy after transurethral resec-

tion, and the microscopic examination of the specimens and subsequent course indicated that they had been cured prior to radical surgery. The fourth patient refused radical surgery and has been well for 16 months following transurethral surgery.

The authors believe that a period of 3 to 4 months of waiting should follow resection of the tumor before radical surgery is done. If there is a recurrence or indication of spread, radical surgery may be resorted to at that time. JOHN R. HERMAN, M.D.

Aplasia of the Penis (Aplasie du pénis). W. BERNARDINELLI, J. MATTOSO, D. ALBUQUERQUE, and J. G. CORDEIRO. Presse méd., 1953, 61: 432.

Congenital absence of the penis is an extremely rare anomaly. Only 7 authenticated cases had been reported in the literature up to 1935. Since that time there has been an occasional case reported so that 15 case reports now exist in the literature. Simple aplasia of the penis is due to the absence of the formation or development of the genital tubercule.

The authors present the case history of a 9 year old white boy with complete absence of the penis but with a normal scrotum and testicles. The parents indicated that the boy passed urine through the rectum and anus. In all other respects, the child appeared to be normal. The boy was able to attend school and apparently had other normal activities. He was the fifth of 7 male children.

Examination showed that the scrotum was normally formed and that the testicles were normal with respect to their position and character. The scrotal and perineal raphe was absent. At the area which corresponded normally with the position of the penis, there was an invagination into the subcutaneous tissue with irradiating folds outward from this point.

Studies showed that the urinary bladder had a normal capacity and that the remainder of the urinary system, including the kidneys and ureters, was normal. Micturition was accomplished completely through the rectum. This represents the fifteenth case reported in the literature and only the third reported as an isolated anomaly without other malformations. ORVILLE F. GRIMES, M.D.

GENITAL ORGANS

Granulomatous Prostatitis: A Condition which Clinically may be Confused with Carcinoma of Prostate. GERSHOM J. THOMPSON and DONALD D. ALBERS. *J. Urol., Balt.*, 1953, 69: 507.

This report was prompted by recent experience with a number of cases in which a preoperative diagnosis of carcinoma of the prostate gland was made but in which microscopic examination of tissue resulted in the diagnosis of granulomatous prostatitis.

The authors wished to clarify the confusion existing between prostatic carcinoma and granulomatous prostatitis, and to uncover symptoms and laboratory findings which might indicate the latter diagnosis preoperatively. Accordingly they obtained at random the records of 36 patients who had received the pathologic diagnosis of granulomatous prostatitis and who had undergone transurethral resections at the Mayo Clinic during the period from January, 1943, to September, 1949, inclusive. No attempt was made to study every case of granulomatous prostatitis in the records of the Clinic and the present report cannot be used as a basis for statistical analysis of the incidence of this entity.

Of the 36 patients with granulomatous prostatitis, 20 were considered to have carcinoma of the prostate as evidenced by preoperative digital examination of the gland. In the complete article, reports are presented of 6 cases which illustrate various phases of granulomatous prostatitis. These include the cases of 2 patients who had eosinophilic granulomatous prostatitis.

Nothing was revealed in the history or physical findings which could be used as positive evidence to differentiate between malignant disease and granulomatous prostatitis. It seems likely that this condition occurs more often than is recognized and that some patients are in danger of being treated for carcinoma of the prostate.

The use of hormonal therapy, such as the administration of stilbestrol, and especially the use of surgical castration, must not be considered in the absence of a positive biopsy or in the absence of roentgenologic evidence of carcinoma of the prostate. Granulomatous prostatitis can produce a consistency of the prostate identical to that produced by carcinoma and, unless tissue is examined microscopically, the proper differential diagnosis cannot be established.

Hyperplasia of the Prostate Gland and Inguinal Hernia (Iperplasia della prostata ed ernia inguinale). LUCIANO DELZOTTO. *Urologia*, Treviso, 1952, 19: 429.

The cases of 8 patients with an enlarged prostate and an inguinal hernia who were operated on by the author's special procedure, are reported. All of them had unilateral hernia, 6 on the left side and 2 on the right. The hernias were operated on by the classical Bassini technique and 2 prostatic adenomas were removed by the typical Freyer method and 3 by the typical Millin technique. Two incisions were used: for the prostatectomy, the longitudinal suprapubic incision and for the herniotomy, the usual oblique incision over the sac.

The two operations were performed at one sitting, the herniotomy first, followed immediately by the prostatectomy. The reason for doing the herniotomy first is the desire to close the incision before the septic locus, represented by the bladder, is opened. The author does not state what he would do in the presence of a bilateral hernia; however, he seems to go along with the American surgeons, Riba and Mehn, who attack the second hernia at a later session.

In discussing the results obtained in these 8 patients with unilateral hernia and prostatic adenoma, the author lays special stress upon the expression of satisfaction and appreciation by the patients themselves. They were all grateful for being freed of both miserable conditions at once. After 2 to 3 year periods of postoperative check-up there have been no recurrences of the hernias. There was 1 instance of hematuria which was controlled in 2 days with the aid of blood transfusions, and 2 instances of infection of the suprapubic wound, easily controlled by parenteral and local antibiotics; these, however, had no relationship with the operative technique employed. The hernial repairs all healed by first intention.

This contribution is added to the medical literature of Italy with the hope of attracting collaboration in the collation of a large operative material done by this method, a material which may settle once and for all the advantages and disadvantages of the double operation, single session technique for the combination of these conditions, a combination which is so frequently encountered in surgical practice, and particularly to establish as rapidly as possible the value of the author's own special succession of techniques. JOHN W. BRENNAN, M.D.

Is the Operation of Choice for Prostatic Hypertrophy the Method of Freyer or that of Millin? (Bei der Prostatahypertrophie-Operation nach Freyer oder Millin?) EDUARD BORCHERS. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1953 273: 353.

Both the subvesical and the subvesical-intravesical adenoma and their removal are discussed by the author. After their enucleation by either the Freyer or the Millin technique a connection remains between the bladder and the prostatic cavity. Only after several months will the function of the internal vesical sphincter return and then the bladder will be separated from the prostatic cavity. When urine fills the bladder and the prostatic cavity after the Freyer procedure, it will remain in these two spaces without seeping through the prostatic capsule as it may occasionally do following Millin's operation. Therefore, the chance of infecting the space of Retzius is less with Freyer's than with Millin's method. On roentgenographic examination no difference could be found regarding the separation of the bladder from the prostatic cavity by a competent internal sphincter following either Freyer's or Millin's procedure. Only during micturition did the cavities connect. The operative technique of Freyer is simpler than that of Millin. It permits inspection of the bladder with regard to stones or diverticula. However, with Millin's approach it is easy to reach the prostate, but the hemorrhage from the periprostatic plexus, including Santorini's, is more annoying, and technical difficulties may arise with obese patients, and those with a narrow pelvis and high pubic bones.

The enucleation according to Freyer is simpler than that according to Millin because of the accompanying venous hemorrhage from the capsular vessels, and suture of the capsule may be difficult. However, it is difficult to assess the role of operative hemorrhage with either technique, judging from the literature, as serious mishaps may occur with either method. The same is true of late postoperative hemorrhages. As to the operative stress, most operators believe it is less with Millin's than with Freyer's operation, and that the patient recuperates quicker from a retropubic procedure. The nonprotein nitrogen has no significance with regard to the operative risk. The mortality has not been found to increase in the presence of high or even very high values of the nonprotein nitrogen. There is also no difference between the two methods as far as the operative risk through circulatory stress is concerned.

It was surprising that infection of the space of Retzius following Millin's operation did not reach the serious proportions that would be expected. There is probably less ascending urinary infection (pyelonephritis) with Millin's operation; however, there is a higher incidence of osteitis pubis, although this condition may occur occasionally following Freyer's operation. It is most likely due to injury of the periosteum and perichondrium during the intervention, but it causes symptoms of pain only weeks or months after the operation. Healing occurs with sclerosis of the bones but without the formation of sequestrum. Urinary fistulas occur with both operations. It is claimed that the catheter can be removed earlier after Millin's operation. The average hospital stay is 19 days for a Millin procedure and 23.4 days for a Freyer prostatectomy, according to some authors, and 25 days for Millin's procedure as against 31 days for Freyer's method, according to another author.

Postoperative follow-up examinations have disclosed that from 80 to 90 per cent of the patients operated on according to Freyer's technique are free from complaints, the residual urine being between 10 and 50 c.c., without permanent sinus formation. There is no reason to believe that there are not as good results from Millin's operation; however, there seems to be a tendency toward vesical neck constriction, which can be prevented by wedge resection.

As to the mortality, it can be stated that this cannot be ascribed to either operative technique per se. This is best illustrated in that one author (Lebrun) performed 170 Freyer operations with only 1 fatality, whereas another (Dubs) reports a 32.1 per cent mortality in 56 procedures of the same type. A study of the reports after Millin's operations shows: 95 consecutive cases without fatality (Grant and Lich) as against a mortality of 13.5 per cent among 37 operations (Meyer, Burgdorff). Kirschner has calculated an 8 per cent mortality among 5,300 Freyer operations. Borchers has found a 5.9 per cent mortality among 3,634 operations with Freyer's technique and a 4.6 per cent mortality among 2,942 operations by Millin's method. The average mortality of the Millin procedure seems to be somewhat less than that of the Freyer operation.

In summary, Freyer's operation may be associated with a higher incidence of injury to the internal sphincter, which is insignificant in regard to incontinence, but it unquestionably carries a higher mortality. Millin's procedure is accompanied more frequently by periostitis and osteitis pubis and may offer technical difficulties because of the topographic anatomical situation; it is, however, a procedure which is better tolerated, but its indication should be reserved for nonobese patients (who are poor operative risks) with an exclusively subvesical adenoma. ERNEST BORS, M.D.

Investigation of the Blood Loss During Prostatectomy (Untersuchungen zum Blutverlust bei der Prostatektomie). TH. HRYNTSCHAK and W. KANZLER. *Zschr. Urol.*, 1953, 46: 6.

The authors believe that there is less blood loss with the suprapubic method of prostatectomy than with the retropubic method. Hryntschak's technique of hemostasis by marginal suture, ligature of the mucosa, and transverse large sutures of the prostatic bed further enhances hemostasis, which, it is believed, can be improved still further with use of a special Tiemann balloon catheter (similar to a Foley bag catheter). The method of Catch and Little (*J. Am. M. Ass.*, 1924, 83: 1075) was used.

Before reporting their own figures, the authors briefly review reports in the literature concerning blood loss with different operations: appendectomy, 26 ml., operations for hernia, 83 ml., cholecystectomy, 180 ml., mastectomy, 400 ml., thyroidectomy, 400-670 ml., transurethral prostatic resection, 260 ml., perineal prostatectomy, 458 ml., retropubic prostatectomy, 608 ml., suprapubic prostatectomy without suturing, 368 ml., and with packing, 510 ml., with the Foley bag and oxycel, 210 ml., and with the Pilcher bag, 630 ml. The article does not deal with postoperative hemorrhages within the first 24 hours.

The authors present a series of 56 patients in whom the average operative blood loss was 258 ml. during suprapubic enucleation. Less than 150 ml. were lost in 15 cases, less than 250 ml. in 22 cases, and more than 250 ml. in 19 cases; among these were 5 patients whose operative blood loss ranged from 529 to 938 ml. The following precipitating factors are enumerated: severe cystitis, too short a period of preoperative drainage, type of prostate (adenomatous versus fibrous), and size of the lesion. When the adenoma weighed below 30 gm., the blood loss was 202 ml., and when its weight was above 30 gm., the blood loss was 314 ml.

The relationship between blood loss and age is given. The average age was 69 years. The blood loss in patients below the age of 69 years was 236 ml., and above that age, 280 ml., which is an insignificant difference. When blood loss, weight of the adenoma, and age are compared, a correlation is discernible in that the loss is less with smaller lesions and in younger patients.

In evaluating the 5 cases with excessive blood loss, the following causes are enumerated: (1) disturbance of blood clotting; (2) arteriosclerosis; (3) prolonged clotting time though corrected at time of intervention; (4) diabetes with large adenoma and technical difficulties; (5) faulty technique. The authors believe that blood transfusion should be used when the blood loss is 500 ml. The blood loss within the first 24 hours after operation was as follows:

1. With a simple Tiemann catheter, 24 patients had an average blood loss of 148 ml., 12 patients below 69 years had a blood loss of 122 ml., and 12 patients above 69 years had a loss of 174 ml. In cases of adenoma weighing less than 30 gm., the loss was 142 ml., and in cases of adenoma weighing more than 30 gm., the weight loss was 160 ml.

With a Hryntschak bag, Tiemann catheter, 30 patients (2 cases are excluded) had an average loss of 107 ml. Although there is a difference in blood loss if the two methods with different catheters are compared, the authors are somewhat disappointed that the Hryntschak catheter did not come up to their expectations. ERNEST BORS, M.D.

Some Problems of Testicular Function. WARREN O. NELSON. *J. Urol.*, Balt., 1953, 69: 325.

Three problems relating to the function of the testes are selected for consideration because the author believed that certain recent observations have helped to further understanding.

The testes in hypogonadotrophic eunuchoidism are the first topic discussed. In this condition the testes fail to mature and remain in the infantile state with a resultant lack of androgenic hormones and the hypogonadic stigmata. A low level of urinary gonadotrophin is the key to differentiating this syndrome from other types of eunuchoidism. The histologic picture of the testes in this condition is of normal prepubertal testes. These testes have been divided into three groupings histologically: (1) those with spermatogonia only or rare spermatocytes, (2) those showing numerous primary spermatocytes, and (3) those showing tubules with all stages of spermatogenesis. Hormonal assays on these groups are incomplete as yet but it is suggested that spermatogenesis in man can occur in conjunction with a deficiency of interstitial cell-stimulating hormone if follicle-stimulating hormone is present, but normal spermatogenesis demands the presence of both gonadotrophic hormones.

The fate of the germ cells in the undescended testes is discussed and data obtained from biopsies of undescended and normal testes in several instances showed that the undescended testes are constitutionally defective in many cases. Factors involved in cryptorchidism are multiple and the response to treatment depends on the factors in a given case. It is suggested that a long range program of study of testes which have undergone delayed descents be instituted.

Germinal cell arrest or spermatogenic arrest is fairly frequently found in azospermic males (22%). Partial arrest and oligospermia is also frequent. In

these cases the primary spermatocyte is the end product of the maturation process and spermatozoa are not produced, or relatively few are completely formed. A variety of conditions have been found associated with this state, but the cause is not completely understood. Elevated temperature, deficiency of gonadotrophic hormones, and interference with enzymatic mechanisms are probably significant factors in producing germinal cell arrest.

There are several excellent photographs of testicular sections illustrating the conditions discussed.

JOHN R. HERMAN, M.D.

MISCELLANEOUS

The Significance of Human Phosphatases for Surgery and Urology. (Die Bedeutung der menschlichen Phosphatasen fuer Chirurgie and Urologie). S. RAABE. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1953, 273: 373.

Routine determinations of serum phosphatase have only recently been introduced in German clinics. The reasons for this are (1) that there is not enough knowledge as to when such determinations are indicated and valuable, (2) methods are cumbersome from a purely technical standpoint, and (3) numerous clinicians who, in spite of all difficulties, tried these determinations were disappointed by occasional "failures." This is true especially for acid phosphatase.

Raabe's method was discussed at the surgical convention in Berlin in 1952. He reiterates briefly the following points:

Neither a normal prostate, a maximally hypertrophied one, nor an incipient primary cancer of the prostate will cause acid phosphatase to appear in the serum. Only malignant prostatic cells which have broken through the barrier of the capsule and settled as true lymphogenous or hematogenous metastases somewhere else in the body will produce acid phosphatase and become, in this respect, incretory cells by secreting their metabolic product into the blood stream.

Acid serum phosphatase can be simulated by (1) erythrocyte phosphatase caused by hemolysis because normal erythrocytes contain from 200 to 250 times more acid phosphatase than the normal serum; (2) the acid phosphatase which appears under pathologic conditions in the serum, which is rapidly inactivated. Even the highest values can be reduced within a few hours to slightly elevated values and in 12 to 24 hours they may appear as normal values in the serum. Both hazards have been overcome: (1) formaldehyde will block the erythrocyte phosphatase (Abul-Fadl), and (2) ascorbic acid will reactivate the acid phosphatase even after 3 or 4 days (Raabe).

A central laboratory has been created for the determination of phosphatase at the Surgical University Clinic of Freiburg, Germany, and from 25 to 35 sera are being shipped to this laboratory daily, not only from the States of Baden and Wurtemberg, but also from East Berlin and the Eastern Zone of Germany. Thus, the experience with 7,000 determinations is presented. Both the alkali and acid phosphatase were studied. The significance of the alkali phosphatase is obvious in disease of the bones. It is elevated with rickets, Paget's disease, tumor of the parathyroids, and primary osseous sarcoma as distinguished from benign bony tumors. Alkali phosphatase remains unaltered in osseous tuberculosis, osteoporosis, and Sudeck's atrophy and it is increased very little, if at all, with osteomyelitis. It is increased in osteoplastic metastases, but remains unchanged by osteoclastic metastases. Obstructive icterus, even in its very beginning, is accompanied by a definite increase of alkali phosphatase at a time when the bilirubin level is still unchanged, while the reverse is true for infectious hepatitis in which the highest bilirubin levels are accompanied by a mild increase of the alkali phosphatase. The alkali phosphatase level is useful for judging the application of x-ray or hormonal treatment. Finally, it is a good indicator as to the healing of fractures, being increased with good callus formation and remaining low with nonunion.

The acid phosphatase is most important in metastasizing lesions of prostatic cancer. With the introduction of the aforementioned method, namely, reactivation of the acid phosphatase in the serum by ascorbic acid, the phosphatase levels became of quantitative value. The blood level of the acid phosphatase represents a direct measure of the extent of metastases, and it is independent of the localization of the metastases. The alkali phosphatase plays a complementary role in that it merely indicates the degree of the osteoplastic involvement. When low alkali phosphatase values are combined with high acid phosphatase values, soft tissue metastases are most likely the cause. While estrogen therapy influences the bone metastases favorably, it does not affect soft tissue metastases. Comparative phosphatase determinations in the course of estrogen therapy are valuable for the supervision and direction of this treatment. Despite this experience, there still remain cases which are refractory to this therapy.

On the basis of a working hypothesis that the carcinomatous cell is not only attacked by estrogens via the pituitary gland but by direct impact, Raabe conceived an ingenious and original method which appears promising. He succeeded, with the cooperation of Butenandt and Druckrey, in procuring a water soluble estrogen preparation which can be injected intravenously. This preparation has no estrogenic properties if in contact with body tissues other than carcinomatous prostatic cells. It is readily excreted by the kidneys and can be injected in great quantity with impunity. However, as soon as this water soluble substance contacts the carcinomatous prostatic tissue, it is immediately reconverted into estrogen through the action of the acid phosphatase which is present in the cells and attaches itself to those cells in which it is supposed

to exert its greatest effectiveness. Thus, not only a cytostatic therapy has been introduced but also a treatment which is aimed and directed selectively by the target itself which it is devised to destroy. This controlled, selective affinity exceeds the accuracy of antibacterial therapy. The author succeeded with this method in controlling the soft tissue lesions caused by metastases of prostatic cancer and he hopes to report further possibilities regarding the diagnosis and therapy of other malignant tumors than prostatic cancer. ERNEST BORS, M.D.

The Pathology of Urinary Calculi: Radial Striation.
J. A. CARR. *Brit. J. Urol.*, 1953, 25: 26.

A group of 500 calculi were studied in an attempt to increase the understanding of radial striations seen in many stones. Each calculus was examined under the binocular dissecting microscope and the composition of its layers was determined optically. A few specimens were subjected to examination by x-ray diffraction techniques.

The observation that radial striation is often associated with surface nodularity was confirmed. Surface nodularity has not been seen in the absence of radial striation. Either or both of these were present in 42 per cent of the calculi studied. Radial striations have been found in areas composed of either calcium oxalate monohydrate, uric acid, or calcium acid dihydrate. Areas showing radial striation have been found to be composed of a single crystalline substance only. Concentric lamination is always present in radially striated calculi. As the result of x-ray diffraction studies, the author states that in radially striated calculi the crystals have one particular axis radially placed in the calculus, but are in random orientation about that axis.

The author compares radially striated calculi to "spherulites" which are naturally occurring geologic concretions. In both, the arrangement of crystals is the same; there is an incorporated matrix and concentric lamination; the coherence and hardness depend on the crystalline component; and a nucleus may or may not be present. Spherulites can be produced artificially by allowing double decomposition to occur in a gelatinous medium. Under these conditions the gel is thought to function by allowing diffusion of reacting ions while preventing convection currents or other disturbances.

The author suggests that the formation of the calculi discussed may be similar to that of spherulites and that the mucinous layer that covers the calculus may act in the same way that gelatin does in the production of experimental spherulites. If this hypothesis proves correct, it may suggest a new approach to the problem of prevention of calculus recurrence. JOHN T. GRAYHACK, M.D.

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

CONDITIONS OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Osteofibrosis Deformans in the Young (Osteofibrosis deformans juvenilis). AUGUST RUETT. *Zschr. Orthop.*, 1953, 83: 284.

The author cites a case of Albright's disease in a 6 year old boy who showed all the characteristic signs of the disease, i.e., café au lait pigmentation of the skin, and bony changes. There were no abnormalities until the age of 2 when he sustained a fracture of the right femur. Apparently without any severe trauma the patient fractured his right humerus five times and the right femur only once. He was admitted to the hospital for an osteotomy of the deformed femur.

The x-ray examination revealed changes in the skull which were characterized by thinning of the inner table and thickening of the outer one. There also was thickening of the anterior portion of the base of the skull. Cystic bony changes were seen in the humerus, ulna, and several other long bones. The bones of the hands and feet, particularly, showed severe cystic changes. The examination of the right upper femur which revealed coxa vara presented an irregular outline of the epiphysis indicative of a disturbance of the femoral capital epiphysis.

The laboratory and neurological examination revealed no abnormalities. The author contends that precocious puberty, described as a third symptom in Albright's disease, may be absent. It is true that the disease occurs much more frequently in girls in whom precocious puberty is frequently observed.

The disease is apparently caused by a disturbance located in the hypothalamic region (diencephalon).

GEORGE I. REISS, M.D.

Acute Osteomyelitis of the Maxilla in Infancy. C. R. MCCASH and N. L. ROWE. *J. Bone Surg.*, 1953, 35-B: 22.

This article deals with a rare but distinct clinical entity. Prior to chemotherapy the mortality was from 25 to 30 per cent. Among the last 13 cases reported, since 1945, there has been but one death.

The disease is essentially an acute inflammation of the maxilla with a spreading thrombosis of its nutrient vessels, followed ultimately by sequestration of necrotic bone and tooth follicles. Rarely does early chemotherapy prevent the sequestration phase.

The primary stage occurs at any time postnatally up to 12 weeks. No definite etiology is noted. The first sign is the appearance of redness and swelling below the inner canthus of the eye in the lacrimal region. At this time the differential diagnosis between dacrocystitis or orbital cellulitis is difficult. This swelling then progresses to the alveolar margin and is followed by drainage in that area. Roentgenologic investigation of the area is of no value at this stage.

The secondary stage consists of multiple discharging sinuses within the mouth or below the canthus of the eye. This stage persists until the sequestra or devitalized tooth buds are extruded or removed surgically. The final sequestrum is usually from the inferior orbital margin.

The surgical anatomy, pathology, bacteriology, and the constant pathogenicity of the staphylococcus aureus are discussed. In the authors' 2 cases the condition was caused by penicillin-resistant staphylococcus aureus. The early use of aureomycin in an attempt to abort the infection is advocated.

DANIEL H. LEVINTHAL, M.D.

Intervertebral Disc Herniation in the Dachshund; the Anatomy of Injuries to the Annulus Fibrosus. (Ueber die Diskushernie beim Dackel. Ein Beitrag zur Kenntnis der Anatomie der Bandscheibenschaeden). GIAN TOENDURY. *Zschr. Orthop.*, 1953, 83: 184.

Tears of the dorsal parts of the annulus fibrosus are usually found in the lower thoracic and upper lumbar segments of the spine in the dachshund. Frequently there are multiple tears of the annulus fibrosus in the lumbar segment of the spine. The herniated nucleus pulposus occasionally causes compression of the spinal cord with ensuing paralysis of the hind legs.

Investigations revealed that soon after birth of the animals the nucleus pulposus undergoes dehydration and the deposition of calcium is observed. The nucleus pulposus loses its elasticity and fails to act as a buffer. Then, tears of the posterior fibers of the annulus fibrosus occur which are followed by protrusion of the nucleus pulposus. This usually is found in the areas of greatest stress.

Case histories and reproductions of histological sections of the intervertebral discs are presented.

GEORGE I. REISS, M.D.

The Sacroiliac Articulation (L'articulation Sacro-Iliaque). Et. de Doncker, A. THYES, and PH. VAN GAVER. *Acta orthop. belg.*, 1953, 19: 7.

In a very extensive and detailed article the authors describe the embryology and the development of the sacroiliac junction in all of its stages; a roentgenographic study is included.

The innervation proceeds from the posterior roots of L3 to S3 and anteriorly from L2 to S1, the obturator nerve, and the sciatic plexus. It is often impossible to differentiate sacroiliac from lumbosacral pain because the signs of muscle contracture and limited mobility are often absent. Although the occurrence of sciatic radiculitis is attributed mostly to disc pressure, there are "sacrocoxalgias" which

are solely the source of sciatic referred pain without root pressure and sensory or reflex changes.

The only clinical differentiation is in the localization of pain. The lumbosacral junction nerve supply proceeds from L4 to S1 only, while the sacroiliac joint with a more ample innervation from L3—S3 is often characterized by radiating pain into the lower extremity. The objective findings are: exaggerated lumbar lordosis, slight external flexion contracture of the leg due to pyramidalis contracture, limited hyperextension, difficulty in lying in the prone, Trendelenburg, and lateral positions, with difficulty in turning around. The Lasegue and Gaenslen tests are positive. There is pain on compression of both iliac spines. Abnormal mobility of the sacroiliac joints is hard to elicit. The posterosuperior and the inferoanterior portions are mostly affected in infections because of the more abundant vascular supply, with predilection of the iliac region in children and of the sacral region in adults.

The physiological widening of the sacroiliac junction during pregnancy can cause temporary reversible lumbar pain. Patients with lumbarization and sacralization not infrequently complain of pain on the normal side. The disappearance of the sacroiliac gap is an early sign of ankylosing spondylarthritis. This was also observed in paraplegics 3 years after the onset of the condition.

Fusion also takes place as a result of reactive decalcification in inflammation of the hip or lumbosacral junction. Accessory sacroiliac joints may lead to arthritic changes. The sacroiliac junction is rarely the site of a direct trauma, the fractures involving the ileum or the ischiopubic region.

The authors do not believe in the existence of a sacroiliac dislocation because of the strong ligamentous support, but partial tears of the sacrosciatic and sacroischial junctions will occur.

ERNEST H. BETTMANN, M.D.

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Partial Claviculectomy. CARRUTH J. WAGNER. *Am. J. Surg.*, 1953, 85: 259.

Loss of motion in the acromioclavicular joint from any cause, be it dislocation, ankylosis, or fixation of the clavicle to the coracoid, will manifest itself by a proportionate loss of ability to elevate the arm. Malunion of the clavicular fractures with loss of the lateral curve results in incomplete elevation by preventing effective rotation of the clavicle.

Absence of the clavicle or its outer third results in but little disability. Although adduction of the shoulder is permitted, no change in carrying position results. The shoulder does not sag and there is no predisposition to the scapulocostal syndrome described by Michele. One does find some instability in complete elevation when supporting a weight. Here the deltoid is at a disadvantage and the clavicle tends to stabilize the shoulder. By the same token, however, a painful joint at either end of the clavicle is most painful in supporting a weight with the arm overhead and a slight instability is usually borne with greater equanimity than pain. In the author's experience the following conditions are indications for resection of the outer third of the clavicle:

Acromioclavicular separation. When the dislocation is complete, conservative therapy is rarely adequate. Resection of the lateral third of the clavicle is a simple approach to the completely dislocated acromioclavicular joint, the operation is easy, and recovery is rapid. The patient quickly enjoys full painless motion and returns to work in 3 or 4 weeks, or earlier, in accordance with his duties. If the operation is performed properly and the trapezius and deltoid are sutured securely, there is no significant deformity. The clavicle must be resected medial to the coracoid or soft tissue will impinge between its lateral end and the acromion on full elevation or the remaining attached coracoclavicular ligaments may be painful when stretched.

Arthritis of the acromioclavicular joint. This condition is relatively common in the older age group and appears to be traumatic in origin. It occurs more frequently in the major extremity and in the laborer. Following resection of the outer third of the clavicle the patient quickly regains a full range of painless motion.

Tuberculosis of acromioclavicular joint and arthrodesis of shoulder. Partial claviculectomy is indicated in patients presenting these two conditions. Tuberculosis of this joint is rare, however; the disease usually has its onset in the acromion and secondarily involves the joint.

The operation may best be performed through a dorsal incision following the lateral curve of the clavicle and preserving the lateral branches of the supraclavicular nerves. The outer third of the clavicle is exposed in the interval between the attachments of the trapezius and deltoid subperiosteally. The bone is bisected just medial to the coracoid and the outer fragment is removed subperiosteally. Removal from the outer end medially is not advised as it disturbs the remaining clavicle unnecessarily and leaves its free end elevated. The wound is closed by mattress sutures between the deltoid and trapezius, obliterating the periosteal bed. The wound is dressed with elastoplast and the arm carried in a sling. Codman exercises are initiated on the fifth day and weight lifting and other exercises at 2 weeks. A full range of motion is present at 1 week in most cases. The patients resumed work in from 3 to 4 weeks in the author's series of 46 patients with the above operation, and the author anticipates that in private practice one would expect this time to be considerably shortened.

In summary, the operation is simple, gives good functional cosmetic results, and rehabilitates the patient more rapidly than any other surgical procedure available for the treatment of these conditions. Prolonged follow-up studies reveal an absence of late complications.

KENNETH E. SHERMAN, M.D.

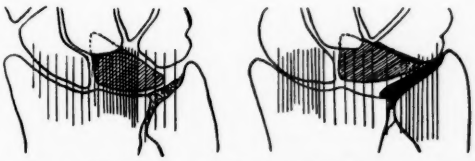


Fig. 1 (Desenfans). a, Compression forces centered toward the carpal lunate bone. b, With the ulna lengthened the compression forces are now directed toward the scaphoid and os triquetrum.

The Persson Procedure for Aseptic Necrosis of the Carpal Lunate Bone (A propos de la malacie du semi-lunaire. Opération de Persson). G. DESENFANS. *Acta. chir. belg.*, 1953, 45: 58.

Persson considers Kienboeck's disease a fracture caused by compression between the inner surface of the radius and the convexity of the semilunar bone which leads to vascular changes and minimal repeated fractures. The compression seems to increase sometimes because of the shortening of the ulna. This occurrence, however, is only one of the contributing factors, because the triangular ligament serves as a buffer between the two bones.

The absence of pain in the beginning does not exclude the existence of a fracture because cartilaginous and spongious structures are void of pain fibers and only when the ligaments are involved does pain become manifest.

Instead of the classical method of prolonged immobilization, Persson has outlined the treatment by lengthening of the ulna, which deviates the compression forces from the semilunar bone.

Two cases of semilunar bone malacia treated by lengthening of the ulna are described. In one of them the time elapsed since intervention is long enough to warrant further recommendation of that procedure.

The author prefers the use of the Duchenne adaption steel plate, which allows easy correction.

ERNEST H. BETTMANN, M.D.

The Orthopedic Treatment of Congenital Hip Dislocations under Arthrographic Control (Le traitement orthopédique de luxations congénitales de la hanche controlé par l'arthrographie). GUILLEMINET, P. STAGNARA, R. FAÏSSE, and L. BERTRAND. *Rev. chir. orthop.*, Par., 1952, 38: 476.

Arthrography was used in order to evaluate the results of closed and surgical reductions.

With the child in supine position and the hip in flexion and abduction, the needle is introduced from below upward into a depression found between the greater trochanter and the ischium, corresponding to the joint cavity. Two cubic centimeters of a 3 per cent tenebryl solution are injected under roentgenographic control. With the lordosis corrected, pictures are taken in internal rotation of 10 degrees and with the hip flexed to 90 degrees and 25 degrees of abduction. The reduction is done by

Fig. 1 (Guilleminet *et al.*). Ten months after treatment. Anteverted but reduced head having passed the limbus with doubtful stability (anterior subluxation).

flexion—abduction combined with traction and internal rotation. Flexion and traction may have to be increased. The fully reduced, stable hip shows a typical arthrogram. The head points toward the center of the acetabulum, or at least it has passed the isthmus and is below the limbus.

In incomplete reductions the head has not passed the isthmus and is only partly engaged. In cases in which the narrowness of the isthmus keeps the head posteriorly from the limbus, the contrast medium demonstrates the distance between the head and the socket. In the most unfavorable position no contact of the head with the isthmus or the acetabulum can be demonstrated.

By means of arthrography an insufficient position can be corrected after 3 months. Sometimes an evidently normal arthrogram shows a redislocation on roentgenographic recheck through the cast.

Repeated arthrograms during the orthopedic treatment demonstrate the decreasing distance between the head and the acetabulum. Complications such as osteochondritis of the femoral head, retardation of the ossification of the acetabular roof, or anteversion can be demonstrated together with remaining subluxation, juvenile arthrosis, and coxa vara. Sometimes, in spite of incomplete correction, a spontaneous reduction can be observed and, without the Lorenz maneuver, by traction and internal rotation only, a correction can be obtained.

Head deformities are a great obstacle in obtaining a stable hip even with surgery. The arthrogram can further reveal an early lack of acetabular roof ossification followed by subluxation, and make it possible to employ acetabular grafts in time.

The arthrography allows a more objective evaluation of the hip disease and shows the results of inadequate correction early, especially when the entrance of the head is blocked above the isthmus.

Before open reduction is decided upon, a 3 months' conservative trial period is indicated.

ERNEST H. BETTMANN, M.D.

FRACTURES AND DISLOCATIONS

Recurrent Dislocation of the Elbow. THOMAS KING. *J. Bone Surg.*, 1953, 35-B: 50.

The author reviews the literature on recurrent dislocation of the elbow written since 1881, describing the various causes of the recurrence and the types of repair for this condition.

He reports 1 case of his own. He used the modified Reichenheim repair which consists of detaching the insertion of the biceps brachii tendon and inserting it into a drill hole through the anteroposterior diameter of the coronoid process. This served to hold the ulna in place on full extension of the elbow without interfering with normal pronation and supination.

DANIEL H. LEVINTHAL, M.D.

Report of a Case of Recurrent Dislocation of the Elbow. W. EMMET SPRING. *J. Bone Surg.*, 1953, 35-B: 55.

The author reports 2 cases of repair in which he constructed new collateral ligaments for the elbow joint using strips of the triceps tendon and fascia lata. The stabilization extended from the olecranon to the medial and lateral epicondyles. One of the patients seen 2 years postoperatively had no recurrence.

DANIEL H. LEVINTHAL, M.D.

An Improved Method in Treatment of Fracture of the Head of the Radius. J. C. CHERRY. *Irish J. M. Sc.*, 1953, 6: 128.

The author divides fractures of the head of the radius into three types: (1) the simple crack, (2) fracture with comminution of the head, and (3) marked displacement of the fragments for which an acrylic resin artificial head has been made available.

The operation consists of a 5 inch incision with anatomical dissection. The resection of the damaged head is carried out by means of a Gigli saw. Certain ligaments are carefully preserved. The acrylic head is fitted and comes in three sizes. This acrylic head has proved useful in the treatment of fractures of the head of the radius which need excision. By using this artificial appliance the formation of new bone is limited while the acrylic head prevents proximal displacement of the radial shaft and strain on the distal radioulnar joint. The author believes that the results in his limited number of cases have been gratifying.

RICHARD J. BENNETT, M.D.

Simultaneous Bilateral Traumatic Dislocation of the Hip. KELLOGG SPEED. *Am. J. Surg.*, 1953, 85: 292.

There are undoubtedly records of a large number of bilateral dislocations of the hip buried in the memories and case histories of surgeons, but the number of reported cases is less than 100, with not many over 60 detailed examples.

The author's report has been withheld for 6 years in order to permit documentation of the injury by means of follow-up study of any subsequent necrosis of the heads of the femurs, the determination of the amount of new bone development around the acetabular fractures and joint capsule, and any evidence of so-called traumatic arthritis. Time has also been allowed to determine the clinical result with regard to range of joint motion, muscular power, action, nerve involvement, and end results after the treatment adopted.

The author's patient, a 38 year old male, was involved in an automobile collision in May, 1946. He presented multiple wounds and abrasions, a posterior dislocation of the left hip with small fractures of the posterior acetabular edge, and an anterior dislocation of the right hip with a less extensive acetabular rim fracture. The right hip was reduced under general anesthesia, although with some difficulty as repeated attempts were necessary. Four days later, under general anesthesia, the left hip was reduced. The patient was placed in a double body plaster of paris spica covering both legs which were held in partial abduction and slightly flexed at the hip joints. About 7 weeks after the injury the plaster dressing was removed. There was an area of diminished tactile and pain sensation along the peroneal nerve distribution on the left side, but no foot drop. The patient was able to return to work within 4 months of the time of his injury. Within 2 years he was able to play golf on week ends and engaged in fairly active physical exercise at will.

In general, the causes of simultaneous bilateral traumatic dislocation may be reduced to a few mechanisms: (1) a heavy blow in the lumbar or sacral region with the legs in spread-eagle or different positions, (2) falls from a height with legs often spread apart, and (3) a combination of (1) and (2) positions plus twists of the legs or torso in a sudden cessation of movement. Warning should be issued to automobile riders, therefore, not only to refrain from sticking elbows and arms out of windows, but also to sit up straight, not to cross legs, and in case of collision to slide off the seat as a unit, if possible, using the arms to protect the face and avoiding abduction of the thighs.

Usually hip dislocations are either posterior or anterior or a combination of these, in accord with the mechanism of the applied violence, the position of the legs and torso, and any twisting or rotation of either. A plan of treatment includes roentgenography for position and fracture, if present, and immediate reduction by manipulation under general anesthesia as soon as the condition of the patient permits. There should be plenty of assistance. Placing the patient on a covered floor permits one's utmost physical power under absolute control and is often the wisest course in reducing dislocation of the hip. Weight bearing is delayed, especially in the face of minor accompanying fractures, but active motion of the hips may be allowed in from 4 to 8 weeks after reduction. Follow-up roentgenologic study for at

least 2 years is indicated to determine any excess new bone formation or possible aseptic necrosis of the head of the femur. Aseptic necrosis of the head of the femur does not follow every hip dislocation, even when it remains unreduced for a period of several days. The ratio of acetabular fracture, the interference with articular circulation due to tension or malposition, hemarthrosis, capsular tear, or pressure, and ligamentum teres laceration are all factors contributing to possible necrosis of the head of the femur. Local pressure and thrombosis seem most important. KENNETH E. SHERMAN, M.D.

Evaluation of the Late Surgical Results in Patellar Fractures. The Indications and Technique of Patellectomy (Enquéte sur les résultats éloignés du traitement chirurgical des fractures de la rotule. Indications et modalités de la patellectomie). J. MARION. *Lyon chir.*, 1953, 48: 203.

The removal of the patella as introduced by Brooke is a standard procedure but requires critical indication. The late results in 96 cases, treated either by soft tissue suture, wiring of the two fragments, or patellectomy, were compared. As a whole, failures were more frequent after suture or wiring than after removal of the patella, which is evidently less hazardous in older patients.

The author prefers partial patellectomy, and usually preserves the proximal fragment. According to his various elaborately devised charts, the author found poor results in 40 per cent and satisfactory results in 30 per cent of the patients operated on without removal of the patella, while among the patients treated by removal of the patella good results were obtained in about 50 per cent. In the latter treatment the age does not influence the outcome, but in the first group the curve of the poor results rose in almost direct proportion to the age.

Patellectomy should be avoided in young individuals with good muscular apparatus and fast recuperation.

The partial patellectomy, mentioned previously, offers anatomical advantages, protecting the femoral trochlea with a remaining cartilaginous roof and maintaining the full function of the extensor apparatus with possible conservation of the upper fragment which contains part of the cartilaginous covering. Of 16 patients 12 presented excellent results following the so-called reconstructive patellectomy.

ERNEST H. BETTMANN, M.D.

Fractures of the Calcaneum, with an Atlas Illustrating the Various Types of Fracture. C. K. WARRICK and A. E. BREMNER. *J. Bone Surg.*, 1953, 35-B: 33.

The authors present an atlas of calcaneus fractures, based on an analysis of 300 cases. They divide their series into two groups. Group I consists of (a) isolated fractures of the anterior end of the bone, 40 cases; (b) isolated fracture of the sustentaculum tali, 1 case; (c) fractures of the tuberosity, of which there were 31 vertical types and 4 "beak" types. The mechanism of fracture of this group remains uncertain.

The discussion is confined to the compression-shearing fractures of group II.

Type I under this group is the division of the bone into two main fractures only: (a) with fracture but no displacement of the posterior articular facet, 28 cases; (b) fracture of posterior articular facet with lateral displacement of the main lateral fragment, 9 cases; (c) with loss of tuber-joint angle but without involvement of the posterior articular facet, 49 cases.

Type II of this group includes an additional secondary compression fracture of the main lateral fragment: (a) displacement of lateral part of the posterior articular facet, 97 cases; (b) displacement of the entire posterior articular facet, 41 cases.

The illustrations in color and the x-ray views of the above fractures are excellent.

DANIEL H. LEVINTHAL, M.D.

SURGERY OF THE BLOOD AND LYMPH SYSTEMS

BLOOD VESSELS

A Critical Study of Present Criteria Governing Selection and Use of Blood Vessel Grafts. RALPH A. DETERLING, JR., MARY S. PARSHLEY, and J. WALLACE BLUNT. *Surgery*, 1953, 33: 213.

From many experiments on dogs since 1945 and from an analysis of 500 autopsies performed at the Presbyterian Hospital in New York, certain facts have been derived concerning the procurement, storage, and use of aortic homografts.

1. Satisfactory results have been obtained with nonviable grafts preserved by quick freezing or lyophilization or by storage for more than 40 days in a nutrient electrolyte solution.

2. Viability of cells in a graft is not an essential factor in assuring functional success.

3. The acceptable age of a donor individual should be estimated from his physiologic appearance and cause of death rather than from stated age.

4. Individuals with a cause of death or associated condition which may be transmissible or about which the etiology is not fully understood should be excluded as donors at the present time.

5. Emphasis should be directed toward rapid refrigeration of the body with less concern being exhibited over the interval of time between death and the procurement of vessel grafts. Aseptic technique should still be employed when obtaining these vessels.

6. Suitable donors, properly handled, should yield satisfactory grafts for a period well beyond 6 hours after death. Grafts obtained from 16 to 35 hours after death from the New York Vessel Bank have been used clinically with success.

From the evaluation of the autopsies and experimental studies on dogs it is apparent that there might be some relaxation of certain restrictions that are presently observed in obtaining arterial grafts. It would appear that the physical age of an individual is a better index of the anticipated degree of aortic sclerosis than the chronological age. The body habitus plays some part in influencing the rate of cooling after death, and hence in the relative rate of deterioration of the tissues. The cause of death may also suggest the condition of the aorta, degeneration being greatest in the individuals dying of myocardial infarction. In all likelihood, the most inflexible restrictions should still be imposed in the consideration of acceptable causes of death or medical conditions. Experience has shown that vessels obtained from individuals dying of penetrating wounds or sustaining ruptured viscera are usually contaminated. The presence of significant amounts of blood in the thoracic or abdominal cavities similarly enhances the chance of contamination. At the same time, however, the culture from the vessel may show no evidence of bacterial contamination and the tissue cultures may be satisfactory. It is of practical interest that no positive cultures were obtained from the animals refrigerated immediately after death. This fact emphasizes the desirability of early refrigeration after death. The tissue-culture, histological, and histochemical studies fully support this. While electronic irradiation of grafts insures sterility, the finding of late calcification in vessels implanted after the use of high doses of irradiation would make adherence to strict aseptic technique advisable for the present time.

The authors would like to give more attention to the length of time a body is unrefrigerated than to the lapse of time after death before the vessels are procured. The latter source of concern arose from the results of early experiments in this field. Gross and his coworkers performed studies on grafts which had been kept moist at 4° C. If the period of storage was less than 6 hours following death, these grafts were successful. Thrombosis or rupture occurred in most instances if the grafts were kept for from 18 to 78 hours before they were used. Recommendations were made that the period after death during which the most satisfactory vessels could be obtained could not exceed 6 hours. The authors stated, "beyond 6 hours, we felt there was a likelihood of rapid appearance of postmortem change and of bacterial contamination."

In another group of dogs, excellent results were obtained by the same authors with grafts stored at 4° C. from 2 to 98 days in a balanced electrolyte solution. Attention was called to the demonstration of viable cells in these grafts during the first 6 weeks of storage. In a subsequent publication viability was considered to be an important factor in assuring functional success, in view of the discouraging results with nonviable frozen grafts. On the basis of those studies limitations were suggested which the present authors now believe may be relaxed. Greater consideration should be given to the factors of body habitus and rate of cooling of the body, as well as of the physiologic age, disease entities, and cause of death of the donor. Properly handled, a well selected body should supply very satisfactory vessels for a reasonably long period after death. Seven grafts obtained from human donors between 16 and 35 hours after death have been used in New York with completely satisfactory results. The reader is referred to the original article for the experimental work, on which some of these conclusions are based.

LEROY J. KLEINSASSER, M.D.

Insidious Thrombosis of the Aortic Bifurcation. Report of 35 Cases. PETER BEACONSFIELD and JEAN KUNLIN. *Arch. Surg.*, 1953, 66: 356.

Thrombosis of the terminal aorta is a condition which begins insidiously and progresses for a considerable time unnoticed, producing at first a nar-

rowing of the aorta and only later a complete obliteration of that vessel. The gradual onset of the disease enables the patient to carry on for months, often for years, complaining only of mild and vague symptoms. It is not until late that alarming signs force him to consult a physician.

Thirty-five such patients were encountered on the surgical service of Leriche, Paris, France, for peripheral vascular diseases in the 8 year period between 1944 and 1951. The cause of the obliterative disease was arteriosclerosis in 28, inflammatory arteritis in 3, thromboangiitis obliterans in 2, syphilis in 1 patient, and trauma in 1. The average age of the arteriosclerotic group of patients was 52 years, which is younger than one would expect of this disease.

A thrombus begins in one of two places: in one common iliac artery, spreading upward toward the aortic bifurcation and then invading both the aorta and the opposite common iliac artery, or in the aorta below the point of origin of the inferior mesenteric artery, spreading downward. From the pathological examination of the resected specimens and from the autopsy material, the former site appears to be three times more common than the latter. The thrombus, which is often found to reach the aorta before it completely obliterates the common iliac artery, grows by extension along the wall, producing for some time only a narrowing of a considerable length of the vessel before complete occlusion occurs. This slow progress of the thrombus formation permits the collateral blood vessels to develop and it is, therefore, not surprising that early symptoms are mild and often unnoticed. In some instances the adventitia of the artery remains smooth and intact, but often there develops a perivascular infiltration around the thrombosed aorta, by which the vessel becomes adherent to the prevertebral fascia and the neighboring veins and lymph nodes as well as to the sympathetic chain. In the late stage of the disease, when edema and ulcerations of the lower extremities develop, it is not unusual to find an associated peripheral venous thrombosis.

Thrombotic obliteration of the aortic bifurcation is almost exclusively seen in middle-aged men, who, except for complaints related to the lower extremities, are usually in good health. The more gradual the obliteration, the better the collateral circulation and the later and slower the onset of symptoms. In the early stages of the disease, the patient consults the physician with one or more of the following symptoms: (1) extreme liability to fatigue of both lower extremities, (2) pain, unilateral or bilateral, which is more in the nature of a dull ache than actual intermittent claudication, (3) low back pain, and (4) loss of sustained erection due to the poor blood supply to the corpus cavernosum. The physical findings are those expected from arterial occlusion with diminished to absent pulses, pallor of the lower extremities, generalized wasting of the legs, and, occasionally, hypertension.

In the late stage of the disease, in addition to the aforementioned symptoms, all the typical features of the ischemic leg of advanced obliterative arterial disease are present. Aortic thrombosis, although apparently well tolerated for years (5 years or even more), will if untreated always terminate in gangrene. The onset of this complication, most commonly seen over the pressure points, is gradual and not always bilateral.

Although the diagnosis should not be difficult, it may be confirmed by an aortogram which should always be taken to obtain a good-sized picture of the site and size of the thrombus, the state of the arterial wall, and the extent of the collateral circulation. Aortography was performed in 31 of the 35 cases reported and all the aortograms showed complete obliteration of the terminal aorta. Except for coarctation of the aorta, which should present no problem in diagnosis, the only condition which may cause similar symptoms and signs is obliteration of both common iliac arteries. In any event, since thrombosis of the aortic bifurcation usually begins in this way, and since the treatment of this condition is little different, the differential diagnosis is of no practical importance.

A favorable prognosis rests on early diagnosis and treatment. In the authors' cases the average period elapsing between the onset of symptoms and the time the patient sought medical advice was 4 years, the shortest interval being 6 months and the longest 21 years. Of the 35 patients, 25 were between the ages of 38 and 42 at the onset of their symptoms, the youngest being 27 and the oldest 57. Without adequate treatment the prognosis is poor and the patient will sooner or later have to undergo a bilateral amputation above the knees. Otherwise he may die of hypertension and uremia resulting from extension of the thrombus to involve the orifices of the renal arteries.

The principles of treatment are bilateral sympathectomy to improve the circulation to the limbs, followed, when possible, by resection of the thrombosed portion of the terminal aorta and common iliac arteries, and, finally, amputation of a portion of the extremity if this becomes necessary because of gangrene. If bilateral sympathectomy alone is done, it can be performed as a one-stage operation provided the general condition of the patient is satisfactory. On the other hand, if the aorta is to be resected, it is usually wiser to do the operation in two stages, performing a right lumbar sympathectomy first and removing the left sympathetic chain and the aortic bifurcation through an extraperitoneal iliac approach 1 or 2 weeks later. In most instances the final decision as to whether the aortic bifurcation is to be resected or not is made at operation. The removal of the thrombosed segment is desirable whenever possible because in some cases the thrombus continues to grow, endangering not only the collateral circulation but also the renal vessels. Also, if the thrombosed aorta is not removed the patient will often continue to have low

back pain, which is probably due to the associated periarteritis. Occasionally, the thrombus will extend so high that it is impossible to reach above it with any reasonable degree of safety. In these instances the authors have resected only the aortic bifurcation and the iliac arteries, leaving a part of the thrombus still lodged in the terminal aorta. The immediate relief of lumbar pain following even this limited removal seems to justify this procedure.

There are some contraindications to resection of the aortic bifurcation. These are: (1) advanced arteriosclerosis with a markedly calcified aorta, the extent of which can be determined by palpation at operation (this precludes ligation and suture of the proximal end of the aorta satisfactorily); and (2) extensive periarteritis found at operation. Removal of the terminal aorta from a bed of dense adhesions containing some of the vital collaterals is unwise. When amputation is necessary it is advisable to do the lumbar sympathectomy prior to the amputation because without this the stump does not heal.

In this series there were 28 patients with early signs and symptoms, 9 of whom were treated by bilateral lumbar sympathectomy and aortectomy. Eight were benefited and 1 died. Bilateral sympathectomy was done in 14 patients with 1 death, and 2 patients who had no change in their symptoms. Bilateral sympathetic block in 1 patient produced no change. Four patients were not treated. There were 7 patients with late signs and symptoms who were treated by bilateral lumbar sympathectomy; in 6 there was no change in the condition. In these instances advanced trophic changes in the lower limbs were already present.

In conclusion, it is admitted that the present methods of surgical treatment of this condition are not entirely satisfactory and the success of the aortic graft replacement in coarctation and in aneurysm of the abdominal aorta suggests that this procedure might be a more rational way of treating the problem. LEROY J. KLEINSASSER, M.D.

Thrombosis of the Aortic Bifurcation Treated by Resection and Homograft Replacement. Report of 5 Cases. JACQUES OUDOT and PETER BEACONSFIELD. *Arch. Surg.*, 1953, 66: 365.

The ideal treatment of arterial thrombosis is the replacement of the obliterated segment with a vascular graft. With this in mind, 5 patients with thrombosis of the aortic bifurcation were treated during the last 2 years, the aortic bifurcation being replaced by a homograft.

Once the diagnosis of thrombosis of the aortic bifurcation is made and confirmed by an aortogram, three points must be considered before grafting is decided upon: (a) the general condition of the patient, (b) the patency of the large arteries of the thigh and calf below the block, and (c) the preparation of the graft. Obviously, this is a major procedure and the general condition of the patient should tolerate such an operation. In addition, a day or two before the operation, the femoral arteries are exposed under local anesthesia and an arteriogram is taken. A direct exposure of the vessels will permit the arterial wall to be seen so that its suitability for anastomosis can be assessed. The roentgenogram obtained by retrograde injection of the dye will show the exact length of the obliteration of the iliac vessels. The homograft used is removed under aseptic conditions not later than 4 hours after death. All branching vessels of the removed aorta above its bifurcation are carefully ligated. The graft is then well washed through to remove all the blood and clots which might have remained in the lumen. After this, the graft is preserved at 4° C. in an isotonic solution to which penicillin and streptomycin and 10 per cent blood serum have been added. The graft is not used unless numerous cultures are found to be sterile.

The technique of operation and treatment is reported in detail, and the reader is referred to the original article for this information. Five such operations were done with survival of all patients, although 1 died subsequently from spread of miliary tuberculosis. These patients have now been followed up for 2 years and all have been found to be much improved symptomatically. There appears to be a remarkable improvement objectively in their condition as well.

Grafting of the aortic bifurcation has up to this time proved to be a better surgical procedure than sympathectomy or arteriectomy alone. In the early stages of the disease before trophic changes have occurred, lumbar sympathectomy, with or without resection of the thrombosed vessels, gives fairly good results. However, if sympathectomy is performed when ulceration and gangrene have already supervened, in most instances it will not benefit the patient sufficiently to prevent a final amputation above the knee.

It may be difficult to decide whether or not a lumbar sympathectomy should be performed concurrently with resection and homograft replacement. If one could be sure that the graft would remain patent, sympathectomy would be unnecessary, but since most of these patients suffer from arteriosclerosis, removal and replacement by graft of the thrombosed segment would not, in itself, affect the pathological process. This process might, at some later date, produce obliteration of the graft or of some more distal vessel of the limb. Sympathectomy should therefore be performed at the same time as resection and grafting, since re-exploration in the future would be extremely difficult because of the marked scar formation in the region of the graft and surrounding tissues. It is noted in the description of the operative procedure that postoperative heparinization is used, this being started as soon as the anastomosis is begun. The blood clotting time is maintained at 15 minutes and is checked every 3 hours for 3 days. During this period, the patient receives an uninterrupted slow intravenous drip to which varying quantities of heparin are added.

LEROY J. KLEINSASSER, M.D.

Autogenous Aortic Grafts Fashioned from a Smaller Artery. WILLIS J. POTTS, HAROLD ALBERT, and HARRY W. FISCHER. *Surgery*, 1953, 33: 518.

The operative treatment of coarctation of the aorta has become a well established procedure. However, there are some instances in which a direct end-to-end anastomosis cannot be performed after the constricted area has been excised. When the proximal and distal ends of the aorta cannot be approximated, either the subclavian artery is swung down and anastomosed to the distal aorta or a graft is used to bridge the defect. The first of these methods has not proved satisfactory. The second method has given excellent short term results, but no long term studies have been reported. Since autogenous blood vessel grafts are preferable because they have been shown to persist as structures almost identical to normal vessels, the authors have devised a method of supplying an autogenous arterial graft of large enough diameter to be suitable for the treatment of coarctation of the aorta, when only a short graft is needed.

A length of femoral artery from 3.5 to 4 times the diameter of the abdominal aorta was excised in dogs. The artery was then split lengthwise and fashioned into a vessel by suturing the 2 short sides together. This newly fashioned vessel had a length equal to the circumference of the original femoral artery and a diameter approximately equal to that of the aorta. The graft was then used to bridge the defect in the abdominal aorta. The implantation of grafts in this manner was done in 19 consecutive dogs, all of which survived operation. Follow-up studies revealed that the autogenous grafts maintained an adequate functional and anatomical channel of approximately the same size as the recipient aorta and that during the short period of observation (1 day to 4 months) the muscle and elastic tissue of the graft persisted as living tissue and did not undergo degenerative changes or fibrous replacement.

These preliminary animal experiments, together with observations of the vessel size in 2 clinical cases of coarctation of the aorta, suggest the possibility of using these grafts when a short graft is needed. However, only by means of long term studies can it be determined whether the elements of the graft will continue to live and be able to withstand the aortic pressure. ROBERT A. NABATOFF, M.D.

Results of Homoplastic Transplantation of the Aorta in Experimental Animals, Covering a 2 Year Observation Period (Ergebnisse tierexperimenteller homoioplastischer Aortentransplantationen waehrend einer Beobachtungszeit von 2 Jahren). J. WEIS. *Langenbecks Arch. u. Dtsch. Z. Chir.*, 1953, 273: 885.

In 9 dogs, segments of abdominal aorta were replaced by arteries or veins of the same species preserved in blood. In 16 animals, a segment of the thoracic aorta was replaced by an artery, and in 5 by a vein. The blood vessels were preserved for periods ranging from 1 day to 35 days. Permeability of the aorta was established in from 20 to 26 months following the operation.

In operations on the thoracic aorta, continuous suture gave the best results. Calcium deposits were detectable in roentgenograms.

The histologic studies showed that in each instance a partial or complete deterioration of the transplanted tissue took place. The necrotic process starts soon after implantation and has no relation to the period of preservation of the segments of blood vessels. Active participation of the implanted tissue in the formation of the new blood-vessel wall could not be demonstrated. In other words, tissue preserved in a nutrient medium acted no differently than dead tissue. Frozen, nonviable segments of blood vessels seem to be as efficient as those used by the author and therefore the success of a blood vessel bank appears to be assured.

JOSEPH K. NARAT, M.D.

Ligation of the Splenic and Hepatic Arteries in Portal Hypertension. A. J. S. MCFACZEAN and J. COOK. *Lancet*, Lond., 1953, 244: 615.

A major problem in the management of cirrhosis of the liver is to prevent death from the direct and indirect effects of hemorrhage from esophageal varices. This is the purpose of any operation designed to reduce portal hypertension. There is no doubt that portacaval shunts prevent the recurrence of hemorrhage in most cases. The authors have attempted to provide a technically simple and effective substitute for portacaval shunts, and 2 types of procedure have been employed: (1) ligation of the splenic artery, and (2) ligation of the hepatic and splenic arteries, with or without splenectomy. These operations were evaluated concerning their effectiveness in preventing further hemorrhage from the esophageal varices and their effect on ascites and hypersplenism.

Ligation of the splenic artery was performed on 5 patients with a history of one or more hemorrhages from esophageal varices. The 4 patients observed following operation had a recurrence of bleeding, and in 2 the bleeding was fatal. No effect was exerted on the varices. Ascites was present in 3 patients, and in 2 it was uninfluenced by the operation. A doubtful effect was exerted on the third patient. The operation failed to correct the hypersplenism which was present in all of these patients. The authors conclude that this operation is useless.

Ligation of the hepatic artery was performed on 7 patients with a history of 2 or more hemorrhages from esophageal varices. In 5 patients the artery was tied close to the coeliac axis, and in the remaining 2 patients the artery was tied immediately distal to the origin of the gastroduodenal artery. In the first 4 patients the splenic artery was tied simultaneously, and in the last 3 patients the spleen was removed. There was 1 death about 3 weeks following operation, due to thrombosis of the portal vein.

In a follow-up study, ranging from 6 to 12 months, the 6 surviving patients had had no further

hemorrhage from esophageal varices. The varices had disappeared in 4 cases, had been substantially reduced in 1 patient, and had persisted unchanged in another. The ascites has been controlled. The hypersplenism had been corrected in the 3 patients from whom the spleen had been removed, but had persisted in the 3 remaining patients in whom only the splenic artery had been tied. Splenectomy in 1 of the latter patients, done 7 months after the first operation, corrected the hypersplenism. All of the surviving patients, previously invalids, are now fully employed.

Of the modifications used, ligation of the hepatic artery distal to the gastroduodenal branch, combined with splenectomy in the presence of hypersplenism, is the operation of choice. This operation has proved satisfactory in the limited period of follow-up.

In an addendum to the original report, the authors describe the ligation of the hepatic artery in 8 additional cases. In 2 of these, it was done in the presence of repeated massive hematemesis; after the operation there was no further bleeding. Among the remaining 6 cases there have been 2 deaths from massive necrosis of the liver; in one the portal vein was thrombosed, but in the other the portal vein was patent and there was no evidence of infection. "In this last case it would appear that our fears that ligation of the hepatic artery might in some cases deprive the liver of its main or only blood supply have been realized." ROBERT A. NABATOFF, M.D.

Successful Resection of a Mycotic Aneurysm of the Superior Mesenteric Artery. Case Report and Review of Literature. MICHAEL E. DE BAKEY and DENTON A. COOLEY. *Am. Surgeon*, 1953, 19: 202.

Although aneurysms involving the superior mesenteric artery are relatively rare, in mycotic aneurysms this vessel is one of the sites of predilection. Sixty-five cases were collected, of which 63 per cent were mycotic, 14 per cent syphilitic, and 23 per cent unspecified.

The authors report the case of a 27 year old woman with compensated rheumatic heart disease, arrested subacute bacterial endocarditis, and mycotic aneurysm of the superior mesenteric artery.

Treatment consisted of extirpation of the aneurysm with concomitant ligation of the mesenteric artery and vein, which relieved all symptoms from the lesion. No other case of successful resection of such an aneurysm was found in a review of the literature.

Mycotic aneurysms characteristically occur in relatively young persons, usually males. In a patient with endocarditis, the occurrence of epigastric pain associated with or followed by the development of an abdominal mass should arouse suspicion of a mycotic aneurysm, particularly if there is expansile pulsation and a systolic bruit in the tumor.

The prognosis is poor and death may be caused by rupture of the aneurysm, or by the underlying disease. The major technical consideration in the surgical treatment of aneurysm of the superior mesenteric artery is concerned with the potential ischemic consequences of occlusion of this vessel. Sudden occlusion of this artery is followed by gangrene of the intestine, but if the occlusive process develops gradually, extensive collateral circulation sufficient to maintain viability and function of the intestine can take place. These factors are equally applicable to the superior mesenteric vein.

Ligation of the superior mesenteric artery as an essential step in the resection of an aneurysm of this vessel can be safely done, provided gradual vascular occlusion has occurred and proper supportive measures are instituted. S. LLOYD TEITELMAN, M.D.

Splenic-Portal Venography. A Technique Utilizing Percutaneous Injection of Radiopaque Material into the Spleen. HENRY T. BAHNSON, ROBERT D. SLOAN, and ALFRED BLALOCK. *Bull. Johns Hopkins Hosp.*, 1953, 42: 331.

The nature, extent, and location of extrahepatic portal vein obstructions are of great concern to the surgeons who attempt to relieve the portal hypertension. Although portal venography during laparotomy is feasible, information obtained by preoperative radio-opacification of that vein system has great value.

An inadvertent intrahepatic venogram was obtained following the injection of iodochlorol into a left upper abdominal sinus tract. The patient seemed to suffer no ill effect from that examination, performed in 1942. Later experiences are recorded.

In dogs, 70 per cent diodrast solution injected directly into the spleen appears in the splenic and portal veins within 2 or 3 seconds, draining for the most part into the right lobe of the liver. Small splenic infarcts are produced by such injections.

The percutaneous injection of 70 per cent diodrast into the spleen has been carried out in 6 patients. A 2½ inch, 18 gauge needle is used. Blood could not be aspirated in all cases. Rapid injection of from 12 to 40 c.c. was performed and several films were exposed at 1 second intervals. Very little bleeding followed the injections, and when the diodrast was injected just under the splenic capsule or directly into the peritoneal space no ill effects were noted. However, those misadventures were followed soon by laparotomies, perhaps too soon to determine adverse effects.

It is required that the spleen be palpable to permit direct injection, although it is not necessary that the injection be made in the axis of the spleen.

LEONARD D. ROSENMAN, M.D.

BLOOD; TRANSFUSION

Researches on the Control of the Blood-Clotting Mechanism by the Sympathetic Nervous System (Untersuchungen ueber die vegetativ-nervoese Steuerung des Blutgerinnungssystems). JOSEF KONCZ and WILHELM MARGGRAF. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1953, 274: 237.

Several authors have noticed that anticoagulant drugs used in thrombosis have a dilating effect on

the blood vessels in addition to the inhibition of the clotting mechanism.

These observations led the authors of the present article to study whether the sympathetic nervous system has any influence on the blood-clotting mechanism. They hypothesized that if an anticoagulant effect seems to be linked to vasodilatation then elimination of the sympathetic nerve may also cause changes in blood coagulation.

In a series of 35 patients with disturbances of the peripheral blood circulation, blood specimens from the femoral artery and femoral vein were examined before and from 1 to 3 hours after peridural block of the sympathetic nerve. Tests were performed to determine (1) the accelerator activity (method of Rieben and Schultze), (2) the prothrombin time (Quick), (3) the inhibition of thrombin, i.e., increase of the thrombin inhibitor by a possible increase of heparin, (4) the inactivation of thrombin by antithrombin (Lenggenhager reaction for thrombin breakdown), (5) the plasma coagulation potential (determination of recalcification time), (6) the fibrinogen portion of the plasma (Westergren's sedimentation test and Costa reaction), (7) the serum albumin (microelectrophoresis), and (8) the oxygen saturation in the arterial and venous blood (Van Slyke method).

In the great majority of the 35 cases it was found that elimination of the sympathetic nerve caused prolongation of the clotting time when the thrombin inhibitor was decisive for the outcome of the reaction. As the activity of the thrombin inhibitor is dependent on the amount of circulating heparin, it is concluded that the clotting system of the blood is subject to the controlling influence of the sympathetic nervous system.

The article presents the techniques of the various tests in great detail and the very complicated theories pertaining to the clotting system. It should be studied in the original. WERNER M. SOLMITZ, M.D.

Recovery and in Vivo Survival of Human Red Cells. IVAN W. BROWN, JR., and HILLIARD F. HARDIN. *Arch. Surg.*, 1953, 66: 267.

Although the long term preservation of blood plasma by freeze-drying has been employed for a number of years, attempts to prolong the preservation of red blood cells beyond 21 or 28 days have thus far proved unsuccessful. Apparently the intracellular crystallization of water is the most damaging of all subzero temperature effects on living red cells. It is possible to prevent the hemolysis of red cells caused by ordinary freezing and the authors' studies confirmed Luyet's observations that preservation of viability at low temperatures is greatly facilitated if the cells are first partially dehydrated and at least a portion of the intracellular water is replaced by one of the lower polyhydric alcohols capable of moderate to rapid penetration of the cells.

This is a report of their studies still in progress which have been conducted during the past 2 years on both quantitative recovery and in vivo survival of human red cells that were stored at subzero temperatures up to 6¼ months prior to tranfusion. Immediately after the publication of Smith's report in 1950, concerning the protective effect of glycerin on red cells stored at subzero temperatures, the authors began a series of investigations to determine optimal conditions for the use of glycerin in preserving human red cells for transfusion purposes. Seven lots of red cells stored in glycerin solutions at—70 C. up to 6¼ months and one lot of red cells stored at—15 C. for 50 days have been studied as to quantitative recovery after rewarming and removal of the glycerin and quantitative in vivo survival after transfusion.

Over 90 per cent of the red cells were recovered after subzero storage at —70 C. and approximately 64 per cent of these cells survived normally after transfusion. Of one lot of red cells stored in glycerin at —15 C., 79 per cent were recovered intact, and 47 per cent of these recovered cells survived normally after transfusion. No immediate or delayed reactions occurred when these cells were transfused.

There was evidence in these experiments that a large portion of the abnormal posttransfusion loss of stored cells was due to the incomplete removal of glycerin from some of the cells before transfusion. Other possible methods for the more efficient removal of glycerin have been discussed.

These studies, with those recently reported by British workers, would indicate that the use of glycerin and subzero temperatures may eventually solve the long-studied problem of prolonged preservation of red blood cells for transfusion purposes.

LEROY J. KLEINSASSER, M.D.

Blood Replacement (Blutersatz). H. BÜRKLE DE LA CAMP. *Langenbecks Arch. u. Dtsch. Z. Chir.*, 1953, 273: 258.

Disproportion between the capacity of the cardiovascular system and the diminished blood volume is not the sole cause of death following great blood losses; neither can erythropenia be made responsible for a fatal outcome, because respiration of patients with only 15 or 20 per cent hemoglobin is sufficient to sustain life. It is the combination of hypoxemia with diminution of the volume of the circulating blood that inactivates cerebral centers and other vital organs and thus causes death. Similar conditions prevail in collapse, which is characterized by hypotension, and in shock which is accompanied by hypertension. In shock, an excessive amount of blood returns to the heart but cardiac insufficiency leads to a diminution of the circulating blood volume.

Blood replenishers may be classified as follows: (1) isotonic crystalloid salt solutions, such as physiologic saline, Ringer's or Tyrode's solution; (2) colloid solutions such as gelatin, casein, human or bovine serum, plasma, gum acacia, polyvinylpyrrolidone, or dextran; (3) solutions affecting the capillary system, such as subsidon.

Crystalloid solutions dilute the circulating blood, reduce the colloid pressure, and leave the circulation

within a short period of time. Although polyvinylpyrrolidone may be stored in the reticuloendothelial system, apparently no harmful effect results. Dextran is not retained in the body, but is converted into glucose and is oxidized. Subsidon contains rutin which is considered by many authors as identical with vitamin P and possesses the property of reducing the permeability of animal membranes; hence the infused fluid remains longer within the circulatory system.

While blood transfusion is the method of choice in the treatment of severe losses of blood, serum, plasma, dextran, or polyvinylpyrrolidone are valuable replenishers in the therapy of burns, shock, or collapse. No saline solutions should be used in the treatment of such conditions.

JOSEPH K. NARAT, M.D.

The Use and Abuse of Blood Transfusion. BERNARD STRAUS and JOSE M. TORRES. *J. Am. M. Ass.*, 1953, 151: 699.

The increased availability of blood due to the widespread establishment of blood banks has resulted in an enormous increase in the use of blood transfusions in clinical medicine. While the greater utilization of blood has produced a recognized improvement in the management of hemorrhagic states and in surgical practice, it also has resulted in an over-all increase in transfusion accidents and diseases, among which are pyrogenic, hemolytic, sensitization and speed reactions, malaria, homologous serum hepatitis, transfusion hemochromatosis, and hemoglobinuric nephrosis.

The authors analyzed a consecutive series of transfusion requests totaling 399 units of blood for 136 patients, with the idea of determining the indications observed, the benefits derived, and the incidence of reactions. One hundred and nine units of blood, or 27.3 per cent of the total units ordered, were never used for various reasons, including overestimation of the requirements for an operative procedure or medical condition, postponed or cancelled operations, reconsideration of the need for transfusion, or the death of the patient. Much of this ordered but unused blood was wasted because of poor refrigeration on the hospital floor or because it became outdated. A reasonable percentage of blood returns, if proper discretion and judgment are employed, is believed to be from 10 to 15 per cent.

The analysis of the indications employed in the administration of the remaining 290 transfusions was based on the following criteria: (1) a red blood cell count of 3.5 million or less in medical conditions, and 4 million or less in surgical conditions; (2) the magnitude of the surgical procedure; (3) the presence of toxemia (with borderline anemia); (4) the use of transfusion as a supportive measure in conjunction with other factors; and (5) duration of life following transfusion in the chronically ill.

Of the 290 transfusions given, 241 were considered indicated, 11 were considered questionable, and 38 were thought to be not indicated according to the objective criteria used. Patients were followed up for 6 months after the transfusion. Ten had definite reactions and 5 had questionable ones. Three patients developed evidence of serum hepatitis. Other complications were pyrogenic (3 definite and 2 questionable), allergic and speed reactions (1 definite and 1 questionable), and hemosiderosis (1 definite). One patient developed a pulmonary edema and died 12 hours after the transfusion; another patient developed pulmonary edema but survived.

The authors conclude that blood transfusions are often ordered promiscuously and administered without regard to proper indications, and that a greater respect for the dangers of transfusion and attention to the proper indications for their use will result in fewer accidents and diseases secondary to the procedure.

EDMUND A. GORVETT, M.D.

Blood Transfusions in Hemorrhage from a Severed Artery. Experimental Study. HENRY W. MAYO JR., and LOUIE B. JENKINS. *Arch. Surg.*, 1953, 66: 137.

The treatment for severe hemorrhage from peptic ulcer with blood transfusions is still a controversial subject, especially with regard to the speed of administration and the amount of blood which should be given. The proponents of the various views on the subject have repeatedly attempted to justify their opinions by an analysis of clinical material. In most instances these analyses do not effectively indicate whether or not blood transfusions in the presence of active bleeding tend to prolong the bleeding, although the definite over-all impression is gained that blood transfusions are more beneficial than detrimental to a patient with an active bleeding ulcer.

The authors, in a series of experiments, attempt to provide a more satisfactory experimental justification for the replacement of blood volume by bleeding dogs from the superficial femoral artery while recording the blood pressures and observing clot reaction in the severed artery. In these experiments it was found that there was a great variation in the amount of blood loss necessary to produce a significant degree of hypotension.

The smallest relative amount lost was 21.7 per cent, resulting in a fall in arterial pressure of 50 mm. Hg., and the largest was 46.6 per cent, resulting in a fall of 80 mm. Hg. Except in 3 of 13 animals, the blood pressure rose to levels approaching the initial blood pressure when the blood volume was restored. The blood transfusions were given at the rate of 8 c.c. a minute to 57.1 c.c. a minute, the average being 22.2 c.c. per minute. When transfusions were given fairly slowly, there was a slow uniform rise in the blood pressure, but when the rate was rapid there was a marked increase in the pulse pressure, and if the transfusion was not slowed, there was a later tendency for the blood pressure to fall. This sequence of events was thought to be due to failure of the right heart. Bleeding from the severed vessel

ceased spontaneously in each case, and did not recur during autotransfusion.

In another group of dogs in which the autotransfusion was started at the same time the superficial femoral artery was severed; bleeding from the severed artery ceased spontaneously and did not recur. In these animals the bleeding stopped in a shorter period of time, which suggested that citrated blood is of value in shortening the course of bleeding. After completion of the blood transfusions, large amounts (average 1,000 c.c.) of isotonic saline solution were given at extremely rapid rates in an effort to make the animals hypertensive. In only 1 animal was any significant degree of hypertension produced. However, in almost all of the animals the pulse pressure increased and was followed by a drop in blood pressure, and if the infusion of saline solution persisted at the same rate, death ensued.

The authors conclude that blood transfusions do not prolong bleeding from an open vessel, which would seem to indicate that citrated blood is of value in shortening the course of hemorrhage under the conditions of these experiments. There was no evidence that blood transfusion, however rapidly given, caused a prolongation of bleeding from the open vessel, or that it would "blow out" a clot already formed in the vessel.

EDMUND A. GORVETT, M.D.

Therapeutic Possibilities of Cross Transfusion. GIUSEPPE VECCHIETTI. *Obst. & Gyn.*, 1953, 1: 402.

The authors have performed 119 cross transfusions between 1948 and October 1, 1951. In all of their subjects they tried to exclude transmissible infectious diseases. They identified the blood groups and Rh factors, and cross-matched the donors and patients. Before 1948 the syringe method was used but they now have a single channel instrument for this purpose. In this apparatus there is one tubular channel for the passage of blood. This is made of polyethylene and is furnished at each end with siliconed needles or cannulas for connection with the veins. The apparatus is described in detail. It apparently can be readily applied for all kinds of purposes in which the extracorporeal circulation of the blood is a feature, such as for an artificial kidney, oxygenation, and blood transfusion.

Although the measurement of transferred blood is precise, one of the problems of cross transfusion concerns the quantitative determination of the admixture of donor blood with patient blood as a function of transferred volume. Formulas have been set up for the determination of this amount of transfusion. Case reports are provided for the following conditions: hyperemesis gravidarum, pre-eclampsia and eclampsia, and acute nephropathies. The experimental results of Salisbury *et al.* have stimulated the author to use cross transfusion in 2 cases of radiation sickness. This resulted in considerable improvement without injury to the donors. Cross transfusions were also employed in menstrual disturbances. In 22 patients suffering from excessive hemorrhages due to climacteric hormone imbalance, cross transfusion was performed. The rationale for the performance in this condition consists in the possibility of administering substances which may promote blood coagulation and also in the possibility of adjusting deranged hormone balances. It is reported that no change occurred in 2 patients, a temporary improvement of the metrorrhagia took place in 3, and a complete cure without any other treatment occurred in the remaining 17 patients. In 2 cases of uterine hemorrhage secondary to implantation of estrogenic substances cross transfusions of 1,000 and 2,000 c.c. were given, respectively, and in both instances the hemorrhages were completely arrested without any other treatment after 2 or 3 days. Six patients with primary agnogenic amenorrhea were treated with unsatisfactory results in 2, while the permanent establishment of menstruation occurred in 2. The method was also employed in 5 cases of uterine hemorrhage of puberty and adolescence, with permanent cure in 3 cases, temporary improvement in 1 case, and no effect in 1.

There were 23 relatively minor undesirable side reactions. These consisted of urticaria, nausea, vomiting, lassitude, headache, and fever. In 2 cases intrauterine death of the fetus occurred, 1 of the deaths being due to an error in blood typing. In no case, either in the patient or donor, was there any reason for anxiety; all side reactions disappeared without treatment and without leaving permanent damage. The author believes that the exchange of blood in the clinical practice of cross transfusion should be limited to less than 10 liters, for at this point the mixture of the two bloods is practically complete and satisfactory therapeutic results can be obtained. Large volumes of blood must be exchanged when it is desirable to exchange substances contained in the tissues, but the reciprocal transfer of such large amounts may lead to more serious reactions. Cross transfusion of small amounts of blood can evidently be repeated many times without incurring danger. LEROY J. KLEINSASSER, M.D.

Complications Following Blood Transfusions, Especially Transfusions of Preserved Blood (Zwischenfaelle nach Bluttransfusionen, insbesondere nach Konservenblutuebertragung). W. HEIM. *Langenbecks Arch. u. Dtsch. Z. Chir.*, 1953, 273: 300.

Complications following blood transfusion may be divided into 3 groups: (1) immediate reaction, attributable to hemolysis and preventable by crossmatching and biologic test; (2) delayed reactions such as (a) allergy detectable by careful history of the donor, (b) pyrogenic reaction, preventable by "depyrogenization" of all apparatus and fluids used in obtaining and preserving blood, (c) overloading the circulation (caution is advised in cardiac patients or those suffering from hemorrhagic shock), and (d) late hemolysis, avoidable by crossmatching; (3) late sequelae such as (a) aggravation of the basic condition, especially diseases of the blood or blood-forming organs, avoidable by a careful history of

the recipient, (b) syphilis, avoidable by examination and history of the donor, (c) malaria and other tropical diseases, avoidable by the donor's history, and (d) homologous serum hepatitis, preventable by study of the donor's history.

Blood transfusion reactions may also be classified as follows: (1) serologic, (2) bacteriologic, (3) biologic, and (4) those attributable to technical errors.

The author stresses the importance of the determination of Rh factors and subgroups, especially when a massive transfusion, repeated transfusions, or a postoperative transfusion in a very anemic patient is contemplated.

Alkali contents of glass containers should not exceed 8 per cent. Copper, zinc, nickel, or titanium may enter the blood from containers, filters, or needles made of improper material.

Among biologic reactions, anaphylactic conditions play the most important role. If the recipient's history reveals sensitivity to proteins, an intramuscular injection of a few cubic centimeters of the donor's serum should precede the transfusion.

JOSEPH K. NARAT, M.D.

Gangrene Following Intra-Arterial Transfusion. WILLIAM S. BLAKEMORE, PAUL R. DUMKE, and JONATHAN E. RHOADS. *J. Am. M. Ass.*, 1953, 151: 988.

Two cases of gangrene of the upper extremity following intra-arterial transfusion are reported. Methods of avoiding this complication and its dangers are discussed.

Anatomic variations in the palmar arches have been reported. In 2 to 5 per cent of the cases the radioulnar anastomosis as a palmar arch is not present. If the emergency is not too great, adequate testing for the collateral circulation should be done. It is believed that puncturing the artery is better than ligating it and that every effort should be made to preserve the continuity of the artery. The use of local infiltration of novocain about the artery is urged to prevent spasm.

At present, the authors use this method on patients in the operating room who are undergoing surgical procedures in which, it is believed, catastrophic hemorrhage is likely to occur.

DONALD C. GEIST, M.D.

SURGICAL TECHNIQUE

OPERATIVE SURGERY AND TECHNIQUE; POSTOPERATIVE TREATMENT

Body Fluid Shifts, and the Sodium and Potassium Metabolism in Patients Undergoing Thoracic Surgical Procedures. ELMORE M. ARONSTAM, CLAUDE H. SCHMIDT, and EDWARD JENKINS. *Ann. Surg.*, 1953, 137: 316.

The authors studied 20 unselected patients undergoing routine thoracic surgical procedures for various conditions; they summarized the results of the procedures and presented 2 illustrative case histories. The patients received only whole blood in the operating room and small amounts of fluid by mouth during the first 24 hours after operation. All further fluid and nourishment through the entire postoperative period was given by mouth.

Despite the low oral fluid intake, adequate postoperative urinary outputs were maintained. Marked postoperative sodium retention was noted, with little change in the serum chloride, serum sodium, carbon dioxide combining power, serum potassium, and urinary potassium excretion.

Plasma volume and total circulating protein deficits in the early postoperative period were probably caused by underestimation of the blood replacement at operation. In almost all of the cases, the extracellular fluid compartment was markedly expanded postoperatively. The writers emphasize the dangers of increased extracellular fluid postoperatively in patients with poor pulmonary reserve, pulmonary hypertension, and anoxia. S. LLOYD TEITELMAN, M.D.

ANTISEPTIC SURGERY; TREATMENT OF WOUNDS AND INFECTIONS

Effect of Injury upon Growth and Some Comments on Surgical Treatment. BERNARD G. SARNAT and PAUL W. GREELEY. *Plastic & Reconstr. Surg.*, 1953, 11: 39.

Normal development of the body is dependent upon the synchronous co-ordination of the activities of the growth centers of the skeleton and related structures. There are three ways in which growth of a bone may occur, namely, (1) by replacement of growing cartilage (epiphysial, articular); (2) at sutures, and (3) on its surfaces (subperiosteal). The marked activity of these three processes in the growing child are in contrast to the inactivity in the adult. Thus, in the adult, while bone tissue is in a state of continuous change as a result of an interplay of formation and destruction, the growth of bones as organs has ceased.

Various types of injury, such as trauma, inflammation, and radiation may affect skeletal growth centers and thereby cause faulty growth of bones. The degree of the subsequent deformity will depend not only upon the type, intensity, extent, and chronology of the noxious agent but also upon its site and its particular susceptibility and growth activity. In addition to the effects upon the growth centers there may be other associated problems. For instance, with spread of a middle ear infection to the temporomandibular joint not only is the growth center of the condyle affected, but also the rest of the joint. Thus, the patient may be seen initially because of an infection or ankylosis of the joint rather than because of a mandibular deformity. Similarly, children who have had benign lesions radiated in areas of growth centers may have not only a growth arrest of bone but also radiation damage of the soft tissues.

The plastic surgeon is frequently called upon to correct these deformities. They are not easily improved by surgical procedures and frequently require multiple operations. The purposes of this report are (1) to demonstrate various growth arrests as a result of different types of injury, (2) to consider some of the surgical principles in the correction of these deformities, and (3) to make a plea to the surgeon, radiotherapist, and pediatrician to avoid or minimize the occurrence of these growth arrests and associated problems.

BENJAMIN GOLDMAN, M.D.

Functional Active Therapy; The After-Care of Injuries to Soft Tissue, Bones, Joints, and Inflammatory Processes (Funktionelle aktive Bewegungstherapie; Ueber "Nachbehandlung" nach Verletzungen der Weichteile, Knochen und Gelenke, und nach Entzuendungen). IMMO WYMER. *Muench. med. Wschr.*, 1953, 95: 266, 289.

The author criticizes practitioners, as well as surgeons, for referring their traumatic cases to masseurs and physiotherapists for the administration of heat, massage, or other forms of medico mechanics as after-treatments. Such procedures are dangerous and can nullify good results of a properly set fracture. On the other hand, proper and well timed mobilization and active therapy may bring good functional results even in cases in which anatomical reduction was not achieved.

Infections of the hands and tendons are discussed. The dangers of prolonged immobilization are cited and the value of well timed mobilization is stressed. Pitfalls in the after-care of fractures of the radius, humerus, ankle bone, shoulder dislocation, and avulsions of tubercles are discussed step by step.

OTTO WEISS, M.D.

The Exposure Treatment of Burns. CURTIS P. ARTZ, ERICK REISS, JOHN H. DAVIS, and WILLIAM H. AMSPACHER. *Ann. Surg.*, 1953, 137: 456.

During the past 3 years there has been renewed interest in the treatment of burns by exposure to the

air. Extensive clinical trials by Wallace, in Britain, by Blocker and the authors in this country have shown beyond reasonable doubt that this method of treatment has distinct merit in selected instances, and that it may be of inestimable value in the initial care of burns under disaster conditions.

This account of the exposure method is intended (1) to describe the authors' experiences in more than 300 patients treated since December, 1949, (2) to point out in what respects various centers differ in details of practice, and (3) to present an evaluation of the method.

When a patient with a burn configuration which permits its complete exposure to air is admitted to the authors' service, he is placed on clean sheets, which are usually not sterile, and, if shock is pending or already present, whole blood and electrolyte solutions are given in accordance with the formula proposed by Purnell and Evans. If severe pain is present, morphine is given intravenously. Crystalline penicillin (400,000 units), procaine penicillin (600,000 units), and tetanus antitoxin or toxoid are administered. As soon as the patient's general condition is stabilized, early definitive local care is initiated. This may be done in the emergency room, in the ward, or in the operating room. Masks are not worn by the patient or those in attendance. All burned areas and surrounding intact skin are washed gently, either with a bland soap, or with a detergent containing hexachlorophene. Blisters are opened and all detached epithelium is cut away. The surface is rinsed with liberal amounts of water. No local applications of any sort are used. The patient is then placed in bed in the most comfortable position that completely exposes the affected areas.

Drying of the exudate is obtained in a position that provides complete exposure of all burned surfaces and maximal comfort to the patient. In most burns, this is possible without much difficulty. Procaine penicillin (600,000 units daily) is given for 5 days. All properly exposed burns are dry in 48 to 96 hours. Since crusts are formed from drying exudate, they tend to be elevated above the intact skin. Deep dermal burns, whose exudation characteristically is scanty, form smooth crusts that are level with the intact skin. Eschars shrink because of dehydration, and consequently are depressed below the intact skin. Crusts and eschars are usually indistinguishable by color.

Once the burns are dry, all efforts are directed toward avoiding injury to crusts or eschars, on the integrity of which the prevention of infection depends. Cracks are ready avenues for invading bacteria. If infection occurs, the crust or eschar surrounding the crack is usually lifted from the underlying tissue for a variable distance. Undermining infection can be prevented by trimming back the crust or eschar to the point where it is tightly adherent. In the first week, such areas often dry out again. Blocker covers these with a piece of fine mesh gauze, and believes that this encourages drying. If suppuration is spreading, crusts or eschars must be removed immediately, and dressings must be applied.

Treatment by exposure ends in partial thickness burns when complete healing has occurred, and in full thickness burns when eschar removal has been achieved. This means that exposure is applicable only for the first 2 to 3 weeks, which represent only a short phase in the long period of treatment of an extensive deep burn. Most eschars should be excised in 10 to 14 days. In the early phases of the study, the excision of eschars is usually delayed until all the crusts have desquamated. Since deep dermal burns may require a long time for complete healing, grafting was unduly delayed in many instances. As more experience was gained, it was learned that an eschar surrounded by a crust of deep dermal burn can be excised, and that the full-thickness area can be grafted before complete healing of the adjacent partial thickness burn takes place. Very deep dermal burns with minimal associated full-thickness injury frequently heal spontaneously in 30 to 40 days if the covering remains intact. In general, however, it is best to remove the covering of such burns if they fail to heal in 21 to 28 days and apply a skin graft. With an increasingly aggressive approach to eschars, the interval between burning and grafting has been greatly reduced, and it seems certain now that the exposure method, properly applied, does not delay the grafting of deep burns.

The preparation of the recipient site for grafting is a problem common to the treatment of all deep burns, and is not particularly related to the type of early care that is given. Granulating surfaces should never be exposed. After eschar removal, the authors prefer to use moderate compression over bulky, absorptive dressings both before and after grafting, as has been recommended by Allen and Koch.

In the author's experience, the fluid requirements in the shock phase are the same for burns treated by exposure as for those treated by pressure dressings. This is not surprising as the widespread belief that pressure limits the need for fluids is not substantiated by experimental data.

The treatment of burns by exposure to the air is an effective and practicable method of local care. Its successful application depends on the hard crusts, formed chiefly from the exudate of partial-thickness burns and on the integrity of dry eschars, composed of the dead skin of deep burns. The crusts and eschars serve as protection against infection of partial-thickness and full-thickness burns, respectively; crusts desquamate when partial-thickness burns are healed, and eschars must be removed, preferably by excision, before full-thickness burns are grafted.

Exposure is indicated in all recent burns that can be completely exposed. It is easily done, but the configuration of some burns may pose problems. The outstanding feature is control of infection. Deep dermal burns heal uneventfully under crusts, which protect the burn from mechanical and bacterial trauma. However, the method is potentially dan-

gerous in that it may encourage inexperienced personnel to delay skin grafting. Granulating surfaces must never be exposed. Judiciously applied, exposure is as good as other methods and, in certain burns, it is definitely superior.

In times of disaster, adequate numbers of dressings and conditions suitable for their proper application would probably not be available. Exposure would then be the only feasible method of treatment, and it is, therefore, particularly gratifying to know that excellent results can be achieved by its use. However, the exposure method is not foolproof and, like all other forms of therapy, demands careful attention to the body's physiologic requirements and to details of management. It is never an excuse for neglect. JOHN E. KIRKPATRICK, M.D.

The Burned Foot. P. S. LONDON. *Brit. J. Surg.*, 1953, 40: 293.

The author describes 301 burned feet and their management, and sets out, in addition, (1) to confirm that primary excision followed by grafting is the best treatment for totally destroyed skin, and (2) to show that thin split-skin grafts provide durable cover for the foot, including its weight-bearing surfaces.

The principles of treatment of the burned foot are the same as those enunciated elsewhere for the hand.

1. Lost skin must be replaced as soon as possible: (a) partly destroyed skin must have the best opportunity to regenerate; (b) totally destroyed skin must be replaced as soon as possible by grafting.

2. Every chance must be given for functional recovery of moving parts by: (a) avoiding infection; (b) limiting edema; (c) reducing pain as much as possible.

3. Later reconstruction is carried out if required.

Twenty-one of the 247 patients admitted with burned feet were suffering from shock due to extensive burns elsewhere and 5 of them died. It is not intended to discuss the treatment of shock, but, when present, shock must receive priority and this may mean some modification of the treatment of the feet. As grafting has to be delayed and the application of an occlusive dressing postponed, every care must be taken to avoid infection by keeping the burned areas covered and the wearing of masks, caps, gowns, and overshoes by the attendants.

If the best results are to be obtained a burned person must receive skilled care as soon as possible. In this district, valuable co-operation has been obtained from general practitioners and factory doctors, nurses, and first-aid workers. They have been asked to limit their treatment to the provision of a sterile or clean covering without any local medicament, and to send the patient to the hospital as soon as possible. On arrival the original dressing is removed and replaced by sterile towels. The burn is examined and its treatment decided on the basis of its depth, extent, and age. The depth is estimated with the aid of the pin-prick test. The examiner wears a mask and uses the no-touch technique with the sterile pin and forceps.

The first, and all subsequent dressing is carried out with aseptic precautions in an air-conditioned dressing room. When indicated, grafting is carried out as soon as possible. Excision of the burned tissues is most easily carried out in a bloodless field since dead fat, which is often stained red by vascular stasis, is otherwise hard to recognize. All dead tissue must be removed and a suitable recipient surface obtained.

Of the 187 grafted feet, 39 required more than one operation up to the time of discharge. Repetitions were called for in 26 per cent of 61 feet grafted on the day of burning, in 14 per cent of 27 grafted from 1 to 7 days after the burn, and in 18 per cent of 99 grafted more than a week after the burn. Whenever possible an attempt was made to account for any considerable failure of a graft to survive.

Of the clinically recognizable causes of such failure, bleeding under the graft was the most commonly recorded, especially in the feet grafted after immediate or early excision of the burn. Unfortunately, the figures are not such as to allow any statistical conclusions to be drawn as to the relationship between bleeding under grafts and the time of grafting. Slipping of the grafts and inadequate removal of the dead tissue were apparently less common causes of failure. Sepsis was only blamed twice.

It is maintained that the best treatment for totally destroyed skin is excision and grafting within a few hours of burning, and this has been carried out as often as circumstances have allowed. In a few cases dead skin has been cut out and grafts have been applied up to a week or so after the burn, provided that hemolytic streptococci have been absent. Delay of more than a few hours before admission increases the risk of infection and makes it advisable to take a swab and apply an occlusive dressing until the bacteriologist's report is available. As a general rule, however, burns that were not grafted immediately were let alone for 2 or 3 weeks until readily removable granulations had developed.

For several years the pin-prick test has been used and has earned a place in diagnosis and prognosis as a useful guide in deciding the depth of the burn. The perception of pin-prick as pain, not merely as touch, means that the superficial pain fibers are intact and that the epithelial cells close to them are also intact. Spontaneous healing with satisfactory skin can be expected of such a burn. The absence of a painful sensation does not necessarily indicate that all epithelium has been destroyed, and this is true particularly in the case of the sole. It must be stressed, therefore, that it is not the author's practice to cut out all anesthetic skin, least of all on the sole. Allowing for these limitations and for those imposed by the age, intelligence, and emotional state of the patient, the pin-prick test is a most useful guide.

Grafting of pressure areas was necessary in 63 instances. The areas most commonly affected were at the margins of, or under the line of, the metatarsal heads and over the Achilles tendon. The back and under-surface of the heel and the base of the fifth metatarsal were less often grafted than the first two areas. In 19 cases, grafts were applied to weight-bearing areas, under the heel and metatarsal heads, and on the pads of the toes. In all cases in which it has been possible to examine split-skin grafts months or years after their application to weight-bearing and other pressure-bearing areas, their suitability for this purpose in burned feet has been clearly evident. In spite of remaining soft and thin, the grafted skin had not ulcerated. The only unsatisfactory result of split-skin grafts on the sole appears to be the development of plantar warts at the junction with the normal skin. This has been seen in 5 patients, none of whom gave any previous history of similar trouble.

The comparison of healing times following primary excision and grafting and delayed grafting leaves no doubt that the former is both practicable and preferable.

Authors of standard textbooks (Brown and McDowell, 1943; Padgett and Stephenson, 1948) indicate the value of split-skin grafts for covering plantar defects, but while they quote a few lasting successes, they devote more space to the use of full-thickness flaps, which they appear to regard as being more suitable when subcutaneous tissue is not present on the site to be grafted. However, they and others (Brown and Cannon, 1946; White, 1937) stress the need for special care of flaps placed on the sole, care which involves the avoidance of pressure until sensation has returned to them (a process taking many months) and the subsequent padding of the shoes.

Burns destroying the full thickness of plantar and other pressure-bearing skin lend themselves particularly well to split-skin grafting. First, such burns are rarely so deep as to destroy the subcutaneous tissue as well as the skin. Second, plantar burns tend to spare the weight-bearing surfaces, partly because weight is borne on them and partly because the thick cornified skin offers useful protection. This means that many of the areas are small, so that a good deal of weight is still borne by skin specialized for the purpose.

The validity in practice of these considerations has been amply confirmed by experience in the author's unit. The problems set by the exposure of unpadded hard tissues in the sole may be very different, but isolated cases of this nature in injuries other than burns have suggested that the use of split-skin grafts is well worth considering even in these circumstances.

It may thus fairly be said that the results of this method of treatment of burned feet are very encouraging. Only 4 of 242 surviving patients failed to make recoveries which were at least satisfactory.

JOHN E. KIRKPATRICK, M.D.

Treatment of Burns with ACTH and Cortisone (Die Verbrennungsbehandlung mit ACTH und Cortison). J. REHN and M. J. WHITELAW. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1953, 274: 175.

A summary of the known facts with regard to Selye's stress theory is given, and the role of the midbrain-hypophysis-adrenal cortex system is described, with special emphasis on the influence of burn as a stress factor; the pathophysiological significance is reviewed.

A series of 13 patients with severe burns were treated with cortisone and ACTH simultaneously, in order to treat the condition generally as well as locally. ACTH must be given simultaneously with cortisone in order to protect the adrenal cortex, which would atrophy from inactivity if cortisone alone were administered.

In all cases, shock and hemoconcentration were treated in the accepted manner, and repair solutions and blood transfusions were used according to the usual standards. All patients received antibiotics freely and were given the benefit of the open method of treatment.

Testosterone was given for its anabolic values in protein metabolism. ACTH was given in the early days after injury (10 to 15 mgm. 3 times a day) with continuous intravenous drip infusion, or, when used intramuscularly, twice as much was given. Cortisone (200 to 300 mgm. daily) was given orally or intramuscularly. As the patients improved, the dosage was reduced to a lower maintenance level.

First or second-degree burns were treated locally with cortisone salve, as were severe burns after healing had set in. This combined therapy reduced shock; toxic manifestations were not allowed to develop to a dangerous degree; temperatures fell swiftly and the pulse rate soon returned to normal; blood pressures found their pretrauma values quickly; urinary functions returned quickly, and pathologic substances disappeared from the urine. All patients became comfortable and free of pain at an early date, and analgesics were no longer necessary. The patients were able to eat with good appetite, thereby avoiding protein losses. Mineral, electrolyte, and vitamin balance was easier to maintain. The burned surfaces dried up very rapidly—an important factor in efforts to reduce the loss of protein. Edema of the wound disappeared quickly and epithelization was more speedy after the necroses were cast off. Complete absence of granulation tissue was noted. Split grafts (Thiersch) take more quickly and there is a definite absence of scarring or keloid formation. It is believed that ACTH and cortisone inhibit the growth of fibroblasts and collagenous tissue. In the authors' patients, the joints moved freely and painlessly, and the incidence of contractures was reduced.

Six excellent color pictures illustrate the local changes. In one case the administration of cortisone with ACTH was erroneously interrupted for one week, whereupon epithelization ceased immediately, but improved upon the resumption of therapy. No

untoward effects such as edema, increased blood pressure, Cushings syndrome, or cardiovascular syndromes were observed. Two patients were known epileptics; they showed no increase in seizures, nor were any psychoses noted. No exacerbation of a tuberculosis or a gastric ulcer was observed. In one instance glycosuria appeared, but promptly ceased upon discontinuance of hormone therapy. As a result of the careful administration of heparin and dicumarol, there was no incidence of thromboembolism. It should be borne in mind that ACTH and cortisone increase the tendency to thromboembolism.

Laboratory studies revealed an increase in 17-ketosteroids immediately after the accident, which is the result of trauma. Their level remained high, increased with higher dosage, and decreased with lower dosage of ACTH, which proves the presence of functional adrenal cortex. The eosinophiles were decreased after the accident and increased only when ACTH was slowly reduced. Decrease in the clotting time, as seen in healthy individuals, was not observed. Anemia did not develop. Testosterone had a beneficial influence on serum proteins, which increased only slowly in spite of a daily intake of 250 gm. of protein. With hormonal therapy, urinary output normalized quickly. Red blood corpuscles and hyaline cylinders disappeared from the urine after 1 week. The urobilinogen remained increased over 3 weeks after the accident. OTTO WEISS, M.D.

The Question of Prophylaxis with Sulfonamides in the Light of Precise Statistical Analysis (Die Bedeutung der exakten Statistik in der Frage der Sulfonamidprophylaxe). H. FUSS. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1953, 274: 121.

In order to study the value of prophylaxis with sulfonamides, very detailed charts were drawn and the findings carefully registered. The results were analyzed and computed with mathematical formulas (Law of Chance) for the purpose of eliminating errors.

Marfanil-prontalbin powder (M. P. powder) and Supronal B. powder were used, respectively. The appearance of a slight reddening of the wound or a drop of serum was enough to classify a case as unclean and excluded the case from the group with primary healing.

A series of 528 aseptic operations was followed up. The operations included appendectomies, work on the alimentary tract, cholecystectomies, hemorrhoid operations, work on the urinary bladder, and the relief of fistulas. All cases were subjects for infection. The sulfonamide powders were sprinkled into the layers of tissue immediately before suturing was done. Half of the cases were treated in this way, and the other half remained untreated (control cases of analogous types). There was no positive proof of beneficial influence from the sulfonamides in the course of healing as there was no difference in the time of healing as compared with that of cases no so treated. Therefore, it can be concluded that in potentially infected cases, a one-time prophylaxis with sulfonamide powder is of no value.

Among 350 cases of traumatic injury to the soft tissue and open fracture, half of the patients were treated with sulfonamide powders after wound excision. Again the cases were grouped properly for comparison, but no advantage was seen from the use of sulfonamide powders for prophylaxis. It was observed, but cannot be statistically proved as yet, that the local use of sulfonamide powders causes tissue damage just like any other chemotherapy as observed in the days of antisepsis.

The author concludes that the prophylactic use of sulfonamide powders (M.P. or S.B.) is a failure.

OTTO WEISS, M.D.

ANESTHESIA

Isopropyl Chloride—A New Analgesic (Isopropylchlorid—ein neues Analgeticum). H. KILLIAN. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1953, 274: 225.

The author, of the Surgical Department of the University of Freiburg, Germany, reports on the physical, chemical, and pharmacological properties of a new analgesic, isopropyl chloride (IPC), and discusses its advantages over ether and ethyl chloride in short anesthesias.

The compound has the formula, $\begin{matrix}CH_3\\CH_3\end{matrix}\!\!>\!CHCl$; so it is chemically related to cyclopropane, and also its pharmacological action shows definite similarities to that of cyclopropane. Its boiling point is 36.5 degrees centigrade, almost the same as that of diethyl ether. However, its solubility in water is 0.308 per cent whereas ether is 7.40 per cent water soluble. The author assumes that the untoward side effects of ether, like nausea, vomiting, and prolonged sleep after the anesthesia, are connected with its high water solubility. These disadvantages are avoided in isopropyl chloride which does not cause nausea and vomiting, has a very faint odor, and the patient awakes promptly after the inhalation has been discontinued. Also, in this respect, IPC is similar to cyclopropane. As there is no danger of vomiting the patient does not have to fast before the anesthesia.

In experiments with mice, guinea pigs, and rabbits it was shown that the animals fell asleep very fast without excitation and wakened promptly if the proper dosage was applied. The vapors do not irritate the mucous membranes of the respiratory tract.

Nothing is yet known about the intermediary metabolism of IPC. Experiments on rats with daily anesthesia with the drug did not reveal any damage of the liver or other organs.

Similar to cyclopropane, IPC in higher concentrations may irritate the conducting system of the heart and cause extrasystoles and tachycardia. Irritation of the conducting system has also been found in the electrocardiogram in several cases.

However, all cardiac symptoms disappear promptly after discontinuation of the inhalation.

For the last few years, IPC has been widely used in Germany and England for brief anesthesias, especially in ambulatory patients and in short obstetric interventions. Up to December, 1952, as many as 175,000 short anesthesias have been performed with the drug in Germany. It is of especial advantage in busy surgical, or ear, nose and throat clinics; it saves much time as the patient is fully awake promptly after the anesthesia and does not need to rest afterwards. Its anesthetic potency is about 1½ to 2 times higher than that of ether.

The technique is discussed in detail. In the beginning 80 to 100 drops per minute are given; as soon as sleep has set in, the anesthesia is continued with half that amount.

In addition to the anesthetic effect, IPC has very definite analgesic properties so that the surgeon can start making incisions right after the start of the anesthesia.

In summary, the author states that IPC is superior to ether and ethyl chloride for short anesthesias; its action is similar to that of cyclopropane. Its only disadvantage is the possibility of disturbances of heart conduction; these subside, however, promptly after discontinuation of the drug.

Whether it can be also used safely for deep anesthesia in major surgery is still open to question.

WERNER M. SOLMITZ, M.D.

Further Observations and Experiences with Medicamentous Ganglion Block During Operations (Weitere Beobachtungen und Erfahrungen mit der medikamentoesen Ganglienblockierung waehrend der Operation). P. WILFLINGSEDER. *Chirurg*, 1953, 24: 105.

The author, of the Surgical Department of the University of Innsbruck, Austria, reports on a series of 30 operations performed under hypotensive anesthesia. In the majority of the cases hexamethonium bromide was used; in some instances other methonium compounds were used. The initial dose was between 20 and 100 mgm., depending upon the age and weight of the patient—the total dose, up to 300 mgm., depending on the duration of the operation. Most interventions were done in the Fowler position and some in the Trendelenburg position, depending on the site of the operation.

The author found the method very satisfactory and quite safe. No untoward incidents were observed in any of the cases although the blood pressure was lowered to 45 mm. in some instances. The time required for the operations is reduced by about one-third, as no hemostasis is needed and the surgeon has a dry field all of the time.

In an earlier article the author had suggested limiting the use of hypotensive anesthesia to organically normal persons and, as a rule, to plastic operations; however, the method has proved to be so safe that these limitations were given up. The cases described in this article include not only plastic operations of the face, but 5 thyroidectomies, 1 radical extirpation of metastatic carcinomatous lymph nodes in the supraclavicular fossa, 1 cecum resection for carcinoma, and 4 resections of the sigmoid for carcinoma. The author states that the postoperative course is milder and the recovery faster than in cases in which operations were performed without ganglion block.

Thirty per cent of the cases in which hypotensive anesthesia was attempted were failures as it was not possible to lower the blood pressure to 60 mm. or below. No explanation is offered for the cause of these failures.

WERNER M. SOLMITZ, M.D.

The Principles of Resuscitation. H. G. SWANN. *Anesthesiology*, 1953, 14: 126.

Previously it has been thought that respiratory arrest occurs first in the process of death and is followed by circulatory failure, and that in the interval between the two failures, there is an opportunity to resuscitate the patient. The author's experimental studies show that circulatory failure may take place not only after, but before or simultaneously with respiratory arrest.

It should be added that during anesthesia the breathing in dogs always fails before the circulation; the depression of the respiratory center by anesthetic agents is no doubt responsible. It is this fact that has led to the false conclusion that breathing fails before the circulation. In conditions pertaining to accidental death in the absence of anesthesia, in which the authors were interested, breathing fails, in general terms, at the same time as does the circulation.

Unanesthetized dogs were used in these studies. With a special mask they were allowed to breathe various gas mixtures. Pure nitrogen, 2.43 per cent oxygen, and 1 per cent carbon monoxide in air were used. Obstructive asphyxia and sea water drowning were also used as a mechanism of producing death.

It was determined that of the animals on which these methods were used after their blood pressure fell below 50 mm. of mercury none could be resuscitated, whereas of those in which they were used before the pressure dropped to 100 mm. of mercury, all could be resuscitated. It was also shown that the time elapse between the drop of 100 to 50 mm. of mercury was approximately 20 seconds. Thus, the animals with the pressure brought down to 100 mm. of mercury could still be resuscitated, but they were only 20 seconds away from irreversible circulatory failure. It was established also that circulatory failure in these dogs occurred when their blood pressure fell below 100 mm. of mercury. In about one-third of the animals breathing stopped definitely after the circulation had failed. Although oxygen was given to the latter group it did not aid the dogs for they had already died of circulatory failure.

Approximately one-third of the animals had circulatory failure after respiratory failure, while in another third, respiratory failure and circulatory failure occurred simultaneously.

After the relation between the time of circulatory and respiratory failure was established, the point at which the brain underwent irreversible pathologic insult from the anoxic experience was investigated. The same agents were used and the animals were resuscitated with cardiac massage and oxygen insufflation. In general, it was shown that the death of these animals caused by exposure to these agents was directly related to their blood pressure. If the dogs were resuscitated when the systolic pressure was between 105 and 62 mm. of mercury, all recovered regardless of the time of exposure. It was shown that some animals could withstand more prolonged exposure if their blood pressure remained above 100 mm. of mercury, whereas in shorter exposure when the fall of the blood pressure was below 62 mm. of mercury, the animal could not be resuscitated. In carbon monoxide poisoning it became clear, however, that the cerebral insult frequently took place before the circulatory failure. From these experiments certain principles of resuscitation were evolved:

Principle 1. The first function to fail during the process of death varies with each type of death.

Principle 2. The death in its several physiologic components is abrupt. When circulation fails, it fails suddenly, passing from an effective circulation (100 mm.) to ineffectiveness (50 mm.) in less than a minute. Respiration suddenly changes from adequate to none in less than 1 minute. The cerebral damage progresses rapidly from absence of insult to lethal insult in about 1 minute.

Principle 3. Resuscitating measures should be aimed at the first function to fail.

Principle 4. The desired reversal of the process of death is accomplished solely by reoxygenation.

Principle 5. Only very small quantities of oxygen are required for resuscitation. From 2 to 4 per cent oxygen gave universally good results in animals with pressure above 100 mm. A notable exception was observed in cases of carbon monoxide poisoning in which pure oxygen was necessary for successful resuscitation.

Principle 6. As long as oxygen gets to the lung alveoli, the method of giving it is immaterial. Little difference was seen whether oxygen insufflation was used, 5 per cent carbon dioxide in oxygen, or an Emmerson resuscitator.

Principle 7. Recovery is rapid; if breathing does not return in 4 minutes, the animal has died. An exception to this was noted in carbon monoxide poisoning in which the dogs took longer to die (8 minutes in 1 animal).

The last principle probably does not apply to man, for many patients we know have been resuscitated after many hours of artificial respiration. However, many of these reports probably deal with the return of consciousness rather than the return of breathing and circulation. Even in dogs, the return of consciousness takes a long time. Furthermore, recovery from carbon monoxide poisoning, electric shock, and semidrowning is notably sluggish in men. Principle 7 apparently could not be applied with much confidence to man.

EDMUND R. DONOGHUE, M.D.

CORRECTION

In the July, 1953 issue, in an abstract of the John E. Steinhaus article entitled, "A Comparative Study of the Experimental Toxicity of Local Anesthetic Agents," from *Anesthesiology*, 1952, 13: 577, "xylocaine" was used in error following the word piperocaine, whereas the correct term should have been "metycaine hydrochloride."

PHYSICOCHEMICAL METHODS IN SURGERY

ROENTGENOLOGY

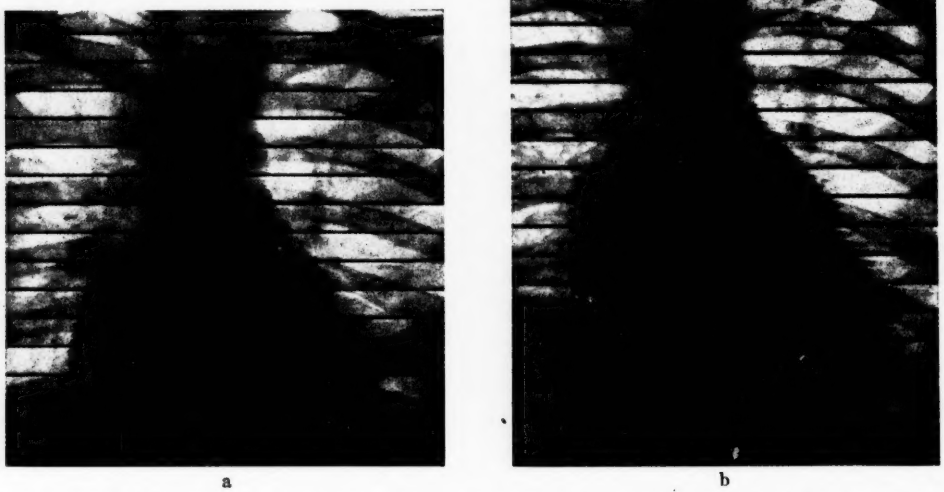
Experiences in the Roentgenologic Diagnosis of the Fibrosed and Calcified Pericardium (Erfahrungen bei der roentgenologischen Diagnostik des verschwielten und verkalkten Perikards). B. SCHLEGEL and G. HEBERER. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1953, 274: 139.

The authors, of the Medical and Surgical Departments of the University of Marburg, Germany, discuss the rontgenologic and kymographic findings in a series of 45 patients who were operated upon for adhesive and constricting pericarditis. They confirm the observations of other authors that, in many cases, the amount of fibrous and calcified tissue does in no way correspond to the severity of the clinical picture. Large calcified sheets and rings may have little, if any, influence on the function of the heart if they are located at a favorable site. On the other hand, comparatively small fibrous processes, especially at the angle between the posterior aspect of the heart and the diaphragm, near the vena caval hiatus, may be sufficient to cause severe clinical symptoms. In other words, the location rather than the extent of the fibrosing processes is decisive for the clinical picture and the indication for surgery.

It is important to take roentgenograms and kymograms not only in the anteroposterior diameter, but in the two oblique diameters. Thin sheets of calcium which occur more frequently than thick ones can often be visualized in other than the anteroposterior directions. For this reason it is advisable to make a fluoroscopic examination of the patient before the kymography is done, to establish in which diameter calcium sheets and rings show up best.

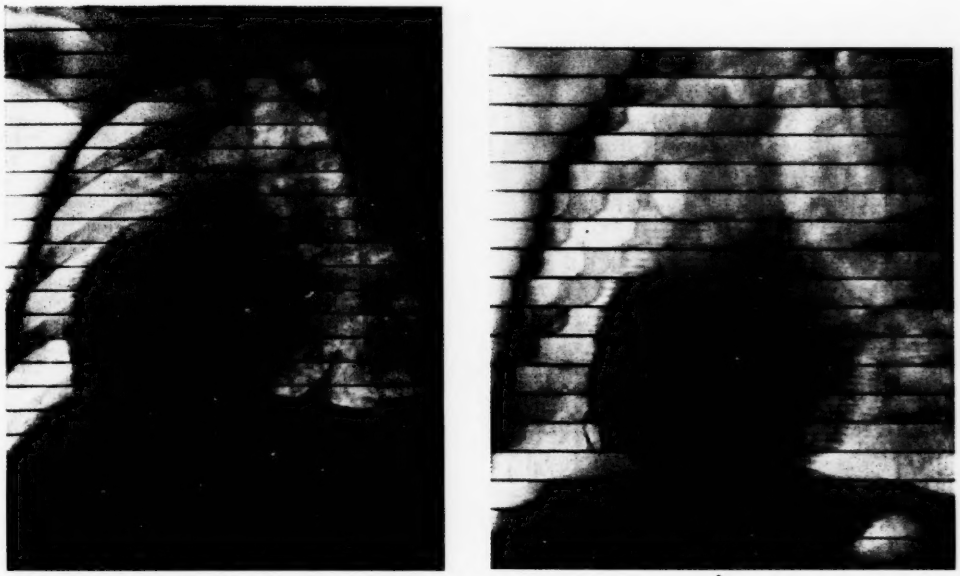
The kymogram gives valuable information on the existence of pericardial adhesions which may impede the amplitude of the heart pulsations. It is important to compare the displacement of the heart in the supine and prone positions. Missing widening of the retrocardial space in prone position indicates extensive adhesions at the posterior aspect of the heart; missing widening of the retrosternal space in supine position is characteristic of adhesions between the heart and the anterior wall of the thorax. When the retrocardial space is involved in the fibrosing process the esophagus may also be subjected to the pull of shrinking scar tissue; therefore barium roentgenoscopy should always be included in the examination. Mere deviation of the esophagus may also be caused by dilatation of the left atrium, but distortion or kinking in addition to deviation is typical for pericardial adhesions.

In adhesions of the inferior aspect of the heart to the diaphragm, the kymogram shows short systolic movements of the left diaphragm. The author emphasizes the importance of thorough exploration of the angle between the posterior aspect of the heart and the inferior vena cava. Adhesions in this



a b

Fig. 1 (Schlegel, Heberer). M. G., 18 years. Constrictio pericardii. Kymogram in dorsoventral direction. a, Before operation; heart pulsations extremely limited. b, After transsternal pericardiectomy; pulsations clearly discernible.



a b

Fig. 2. E. S., 18 years. Kymogram in second oblique diameter. a, The condition before, and b, the condition after the operation; extensive removal of the calcium rings; the heart pulsations are clearly improved.

area may constrict the vena cava and seriously impede the venous return.

The various fluoroscopic, roentgenographic, and kymographic methods mentioned in the article permit the surgeon to plan the details of the operation in the individual case and to insure optimal results.

The article contains a great number of excellent kymograms. It is of special interest to compare the kymograms before and after the operation.

WERNER M. SOLMITZ, M.D.

Some Contributions of Radiology to the Pathology of the Female Breast. J. GERSHON-COHEN and H. INGLEBY. *Brit. J. Radiol.*, 1953, 26: 87.

The correlation of x-ray studies of the breast in 400 patients, along with serial sections studied histologically, has resulted in a better understanding of pathological states and a classification of lesions which corresponds to clinical findings.

This classification is as follows:

1. Mazoplasia
   - Group 1
   - Group 2
2. Adenosis (unencapsulated lobular hyperplasia)
3. Fibroadenoma
4. Secretory disease, with or without plasma cell mastitis
5. Papilloma
6. Mastopathy (Schimmelbusch disease)
7. Carcinoma

Efforts at classification and prognosis in carcinoma have so far not proved satisfactory from a practical point of view. The x-ray film showed changes in cases of breast carcinoma which may be of great value, however. The most significant of these is thickening of the breast trabeculae in comparison with those of the opposite gland. This trabecular thickening proves histologically to be due to proliferation of myoepithelial cells which arise from the basal layer of the epithelium. The myoid cells are a prominent feature in many carcinomatous breasts and are responsible for laying down fibrous tissue in the wall of the duct. It is suggested that the amount of such thickening (myoid proliferation) may be an indication of duration of the carcinoma and, hence, of prognostic import. However, longer follow-up will be necessary before any such conclusions can be drawn.

It has been possible roentgenographically to recognize two groups of carcinomas as classified by Leborgne, namely, the "scirrhous" and "duct" carcinomas. Duct carcinomas show enormous numbers of minute punctate calcifications following the lines of the ducts and they are often seen outside of the primary growth. Leborgne states that the duct type of carcinoma has a longer duration and better prognosis than other types and it seems probable that this is the same type of carcinoma as that which has been classified clinically as "comedo" carcinoma.

LOIS COWAN COLLINS, M.D.

Radiotherapy in Cancer of the Breast. SIGVARD KAAE. *Acta Radiol.*, Stockh., 1952, Supp. 98.

This is an excellent monograph based on a detailed analysis of the results obtained in 1,418 new cases of cancer of the breast which were treated from 1931 to 1944 at the Radium Center of Copenhagen, Denmark, under the directorship of Jens Nielsen. The author spent more than 7 years in compiling the present material and, following the suggestion of Nielsen, paid particular attention to study of the value of preoperative roentgen therapy as an adjunct to radical mastectomy in the technically operable cases.

The monograph contains sixteen chapters dealing with the several combinations of surgical and radiotherapeutic approaches currently used for the treatment of cancer of the breast, as well as with the various clinical, gross pathological, and histological factors which may influence the outcome of the treatment. The author has made an exhaustive study of the pertinent literature and quotes profusely from many publications with the purpose of co-ordinating the available data and establishing definite conclusions. He has re-analyzed his own material in the light of the operative criteria posed more recently by Haagensen and Stout, and was able to confirm the validity of these criteria. Likewise, he has re-studied the group of cases in which treatment was given by means of limited surgery and intensive postoperative roentgen therapy, as now advocated by McWhirter, but found the results not at all comparable with those of McWhirter; he believes, therefore, that it is as yet too early to assess the true value of this method.

Of the total of 1,418 patients, 463 were treated by preoperative roentgen therapy and radical mastectomy—a combination which, as already stated, occupied the author's main interest. Up to June 1, 1938 a moderate preoperative dose was delivered to the breast (1,600 roentgens in 9 days) and axilla (800 roentgens in 9 days), and a small postoperative dose was given to the operative field. After that date, a considerably larger preoperative dose was given to the breast (3,500 roentgens in 1 month), and the axilla and supraclavicular region (3,300 roentgens in 1 month) without any postoperative irradiation. The radical mastectomy was performed 1 month after the completion of the roentgen therapy or somewhat later, but not more than 90 days. The irradiation was carried out with 180–193 kv. and ½ mm. of copper at a 40 to 50 cm. focal skin distance. The 5 year survival rate in all 463 cases was 58 per cent, and the 10 year survival rate in 141 cases was 34 per cent. In comparing the results of the two periods it was found that they were somewhat better in the latter when larger doses were used.

The author arrived at the over-all conclusion that it is questionable whether the combination of preoperative roentgen therapy and radical mastectomy should be recommended systematically in preference to other combinations currently used for the treatment of operable cancer of the breast. However, in the cases with marked local progression it is of indisputable value.

A very comprehensive bibliography of 233 articles is appended. T. LEUCUTIA, M.D.

Problems of Bronchographic Tumor Diagnosis (Probleme der bronchographischen Tumordiagnostik). H. VIETEN. Chirurg, 1953, 24: 101.

The author (of the Surgical Department of the Medical Academy at Duesseldorf, Germany) discusses the technique of bronchography and the bronchographic diagnosis of tumors of the bronchi. His observations are based on a very large material of 2,500 bronchographies performed during the last 3 years. In view of the appalling increase of bronchial carcinoma during the last decade and the desirability of early diagnosis, bronchography should be a routine procedure in all suspicious cases. In certain conditions it is even superior to bronchoscopy; the author mentions several cases in which bronchoscopy was negative but bronchography revealed the presence of a tumor.

He warns against the use of pantocain or similar compounds for anesthesia of the tracheobronchial mucosa. Numerous fatal accidents from these compounds have been reported. Only rhenocain, which has one-third of the toxicity of pantocain, should be applied. Furthermore, no adrenalin should be added to the solution because it increases the toxic effect of the anesthetic by 100 per cent and more.

The differential diagnosis between bronchial carcinoma and bronchial stenoses of other origin is discussed. A circular, conus-shaped narrowing of the lumen always causes one to suspect carcinoma, whereas an excentric hemispheric tumor bulging into the lumen indicates an adenoma or other benign tumor.

Carcinoma is by far the most frequent cause of bronchial stenosis. In a series of 559 stenoses bronchographed by the author, 500 were caused by carcinoma.

The author describes a sign which has not been described previously. In maximal inspiration and expiration the normal bronchogram does not show any displacement of the mediastinum. In bronchial stenoses, however, the mediastinum is displaced toward the involved side in maximal inspiration. The bronchogram in these cases shows a double contour of the tracheobronchial tree. This pendular movement of the mediastinum is possible only if no mediastinal lymph node metastases are present. If the double contour is not seen in a case of bronchial carcinoma the presence of metastatic lymph nodes or tumor masses immobilizing the mediastinum is probable. WERNER M. SOLMITZ, M.D.

The Osseous Roentgenographic Findings of Chronic Renal Insufficiency. JAMES G. DAVIS. *Radiology*, 1953, 60: 406.

Osteonephropathy may result from primary urinary tract disturbances such as chronic glomerulonephritis, congenital malformations, urinary tract

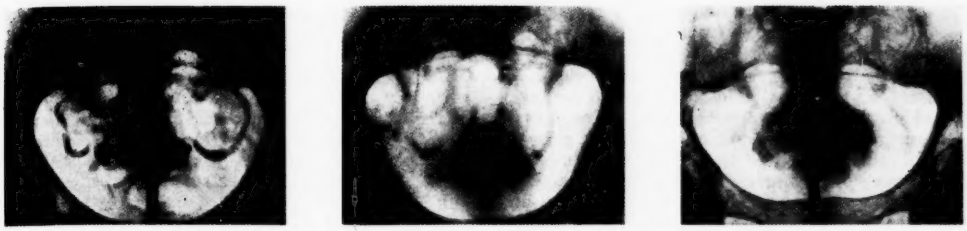


Fig. 1. (Friedhoff). Fish hook shape of the ureter in bladder neck tumor.

obstructions, and primary tubular function changes, or from primary extrarenal disturbances such as hyperparathyroidism or cystine storage disease.

In adults the bone changes in "renal osteitis" are predominantly those of decalcification and cortical thinning and disintegration. In the more protracted cases, osteosclerosis may occur.

A case is reported in which the osteosclerosis was a very prominent part of the picture. The spine and pelvis showed extensive increase in density, thought possibly to be due to atypical Paget's disease or to prostatic carcinoma. In the pelvis there were destructive lesions.

At autopsy the bone marrow was found to be very hard and sclerotic. There was diffuse osteosclerosis with resulting encroachment on the marrow spaces, careful search of which failed to reveal carcinoma cells. There was no evidence of Paget's disease.

The conclusion was that the osteoblastic reaction was due to chronic renal insufficiency (in this case, chronic pyelonephritis with uremia).

LOIS COWAN COLLINS, M.D.

Intravenous Urography in Tumors of the Bladder Neck (Die intravenoese Urographie bei der Blasenhalsgeschwulst). E. FRIEDHOFF. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1953, 274: 132.

The author (of the Surgical Department of the University of Cologne, Germany) studied the diagnostic value of intravenous urography in a series of 100 cases of tumors in the area of the bladder neck and compared the results with other tests of kidney function. He states that intravenous urography offers more valuable information than any other method as it tests the kidney function and, at the same time, enables visualization of typical anatomical changes of the distal portion of the ureter and the shape of the bladder, which, together with digital and endoscopic exploration, provides accurate data on the shape and size of the prostate. It should be used routinely in all cases of prostatic disease.

The author emphasizes the limitations and risks of the classical concentration and dilution test of Volhard. Only normal results prove that the kidney function is good, whereas abnormal results may be caused by pathologic processes outside the kidney. Moreover, the Volhard test is a considerable hardship on the patient and not without danger. In 23 of the 100 cases it caused fever during the thirst period and 1 patient, 81 years of age, died of pulmonary edema and heart failure within 24 hours after drinking 1,500 c.c. of water. Death was attributed to overburdening of the heart by the large amount of ingested water. WERNER M. SOLMITZ, M.D.

Roentgen Interpretation of Vesiculograms. ATHAYDE PEREIRA. *Am. J. Roentg.*, 1953, 69: 361.

Realization of the significance of disease of the seminal vesicles and spermatic tract in relation to diseases of the kidneys, ureters, and bladder, as well as further knowledge of diseases of the urinary tract itself, has increased the indications for roentgenography of the seminal vesicles and spermatic tracts.

The opacification of the seminal vesicles and spermatic tract can be accomplished by the injection of contrast material by either of two methods.

1. The ejaculatory route (transurethral), in which the ejaculatory ducts are catheterized by use of a fine elastic sound. The method is difficult at times because of variations in the position of the orifices of the ejaculatory ducts, and because of obstructions at the orifices, due principally to disease. The risk of trauma to the ducts and the urethra is considerable.

2. Direct injection into the vas deferens by vasopuncture. This requires surgical exposure of the vas deferens, a relatively simple procedure which can be accomplished under local anesthesia. The contrast medium used may be either oily or aqueous but the latter type is preferred. Thorotrast, Schering's uroselectan, and Bayer's perabrodil seem most satisfactory.

The quantity of opaque material injected varies from 1.5 c.c. to 3 c.c. on each side. Excess causes overdistention of the seminal vesicles and extravasation. Reflux of excess material into the bladder may partially obscure the area to be studied and therefore repeated irrigations of the bladder should be done before films are taken.

By this method a great variety of developmental variants and anomalies can be demonstrated. Inflammatory diseases may show reduction in the size of the lumen because of edema or thickening of the walls. If the duct is obstructed, the injection should be discontinued. In frank empyema of the seminal vesicle, dilatation will be shown. Cysts and malignant tumors may deform the system. By obstructing the ducts they may cause intravesicular and extravesicular ectasia. LOIS COWAN COLLINS, M.D.

The Roentgen Manifestations of Unrecognized Skeletal Trauma in Infants. FREDERIC N. SILVERMAN. *Am. J. Roentg.*, 1953, 69: 413.

The roentgen signs of trauma to the skeletal system in infants should be very familiar to the roentgenologist since the history of the trauma is not always forthcoming. Many individuals responsible for the care of infants and children may permit trauma and be unaware of it, forget it, or be reluctant to admit it. Without the history, the bizarre appearances which may result from trauma may lead to an erroneous diagnosis and tremendous emotional upheaval for the patient's family.

Three cases are described in detail, all of which showed striking roentgen manifestations of unrecognized trauma, and additional cases are cited. The history of trauma in these cases was established only after particular questioning. For instance, in 1 case in which there was concern over several rib fractures encountered in the course of routine chest examination, it was learned that the child's father had been in the habit of throwing him up in the air and catching him during play.

Prior to the eliciting of the critical history, the differential diagnosis must include the whole gamut of skeletal abnormalities, most of which can be excluded on the basis of the child's general good health and often by the presence of other similar lesions in the bones which had not attracted attention.

LOIS COWAN COLLINS, M.D.

A Qualitative Comparison Between the Standard Type of Examination and Tomography for Certain Intraosseous Structural Changes. FOLKE KNUTSSON. *Brit. J. Radiol.*, 1953, 26: 113.

Vertebral lesions of known size were studied by standard and laminagraphic methods to determine the comparative value of the procedures. A water phantom was employed and the vertebrae were placed at different depths so that body conditions might be simulated.

Standard methods were shown to be better in the study of the structural pattern of vertebral bodies because the laminagraphic blurring causes a homogeneous appearance with loss of structural detail.

Laminagraphy is absolutely superior to standard methods in dealing with negative defects, as lesions are shown by laminagraphy which cannot be seen on standard studies. A negative defect 15 mm. in size is readily seen with laminagraphy, while a 20 mm. defect is barely visualized by standard methods. The negative defect is better shown by transverse than by longitudinal laminagraphy.

Positive defects, obtained by removal of a portion of cancellous bone and filling of the defect with opaque media, are absolutely better shown by laminagraphy than by standard methods.

Cortical bone defects as small as 2 mm. are so well demonstrated by standard methods that laminagraphy is not of advantage.

Studies of fractures about the knee joint are much better demonstrated by laminagraphy, and many fractures visible with tomography are not seen with standard methods. Laminagraphy is also superior in the exact definition of compression fractures.

In addition to the absolute superiority of laminagraphy mentioned, a practical superiority also exists in that in many instances, i.e., study of the odontoid process, the technical procedure is made easier and simpler.

JOHN J. GAUGHAN, M.D.

Roentgen Examination of Bennett's Fracture. LARS BILLING and K.-O. GEDDA. *Acta radiol.*, Stockh., 1952, 38: 471.

Bennett's fracture is an intra-articular solution of continuity of the base of the first metacarpal bone. In Sweden a malunited Bennett's fracture is a 25 per cent compensable disability.

The method of treatment commonly employed in Sweden is the insertion of a Kirschner wire into the small fragment at the base of the metacarpal (which is held in place by its ligamentous attachment to the greater multangular bone), reduction of the dorsoradial displacement of the shaft of the metacarpal, and looping the Kirschner wire through the metacarpal. This wire is removed after healing has occurred.

A true lateral roentgenogram is necessary in order to determine whether satisfactory reduction has been obtained. The dorsoradial tubercle of the greater multangular bone is used as a landmark to determine if the view is truly lateral. On a true lateral film this dorsoradial tubercle of the greater multangular bone is barely seen; with rotation from the lateral this tubercle becomes more and more prominent.

Technically, this true lateral view is obtained by placing the hand palm down on the film and then pronating the hand from 15 to 35 degrees. A special device for facilitating the pronation is described. The x-ray tube is displaced distally and then angled 20 to 30 degrees.

There are excellent prints of roentgenograms showing true lateral views of the base of the first metacarpal in the original article.

JOHN J. GAUGHAN, M.D.

Discography in Ankylosing Spondylitis. RAGNAR ROMANUS and SVEN YDÉN. *Acta radiol.*, Stockh., 1952, 38: 431.

Narrowing of the intervertebral discs in association with ankylosing spondylitis has been stressed in recent years. This differs from the older concept that the discs remain normal and are not involved.

A series of 110 men with ankylosing spondylitis was studied, and discography was performed on 30 of these patients. Of the 74 discs so studied, 35 were diseased. Twenty-nine of the 35 discs showed the usual degenerated pattern, and 6 had the appearance of atypical rupture with the contrast media entering irregular cavities in close proximity to the bone formation spanning the space between two adjoining anterior vertebral bodies. This atypical pattern may be explained by extension of the inflammatory in-

volvement to the discs. Discography reproduced the lumbago-sciatica symptoms, which are typical of disc protrusion, in 6 patients.

With atypical sciatica and upper gluteal pain, and x-ray evidence of sacroiliac spondylitis, a protruded disc must still be ruled out. It is necessary to try to differentiate the symptoms caused by disc protrusion and spondylitis, and it must be remembered that they can occur concomitantly. Proper therapy can then be instituted. JOHN J. GAUGHAN, M.D.

An Improved Device for Making Harmonic Prints from Radiographs of Great Contrast. G. SPIEGLER and P. GILES. *Brit. J. Radiol.*, 1953, 26: 130.

A harmonic print is a print which shows detail in all regions of a contrast negative equally well. Such a print makes possible the reproduction of a contrast x-ray film without loss of detail, and permits the inclusion of film reproductions in publications which otherwise would be unacceptable.

A detailed description of a method and a device for obtaining harmonic prints is described. The harmonic print, with its preservation of good detail and with the simultaneous compression of the over-all tone range, may represent the roentgenograph of the future.

This excellent article can serve as a ready reference for authors who intend to include film reproductions in articles or publications.

JOHN J. GAUGHAN, M.D.

MISCELLANEOUS

The Place of External Irradiation in the Treatment of Osteogenic Sarcoma. R. C. TUDWAY. *J. Bone Surg.*, 1953, 35-B: 9.

It is a common belief that in cases of osteogenic sarcoma a chance cure is afforded only by amputation and that radiotherapy is useful only for palliation. This is partly true but not entirely so, for external irradiation has a definite place in the curative treatment of certain cases. It is especially important that a positive diagnosis be made.

In this article a total of 33 cases are drawn from those classified by the Bristol Bone Tumour Registry. Eight of the cases were osteolytic, and 25 were osteoblastic, osteogenic sarcomas.

The division of the cases into osteoblastic and osteolytic types is useful in assessing the prognosis. The distinction is based on the roentgenographic appearances. Histologically, about half of the osteolytic tumors in this series were of the spindle cell variety, but only 1 of the osteoblastic tumors was spindle-celled, the rest being polyhedral-celled.

There was a high proportion of histological grade 3 tumors among the osteolytic cases. Treatment had little influence on the course of the osteolytic tumors. This was perhaps largely due to the fact that most of the tumors occurred in the axial skeleton, where neither amputation nor effective dosage with radiation was possible.

Except for 1 case, in which the patient died soon after admission to the hospital, palliative deep x-ray therapy was given in all cases. A dosage of over 5,000 roentgens produced good symptomatic relief in some, but in no case of osteolytic tumor was there evidence of real arrest of the tumor growth. Osteolytic sarcomas arise commonly in previously abnormal bone and in the older patients. These two factors usually go together and, as in the case of osteoblastic tumors, are associated with a poor prognosis.

Osteogenic sarcoma is derived from tissues that carry the potential ability to form bone. It is possible to grade osteogenic sarcomas by histological methods as grades 1, 2, or 3 in what appears to be an ascending order of malignancy. The method is applicable to both polyhedral-celled and spindle-celled types. The amount and type of tumor matrix is not a reliable criterion, and while the degree of cellularity and the morphology of the cells were features of some value, the most important feature was the degree of nuclear activity as estimated by the mitotic ratio. The following ranges were found: grade 1—mitotic ratio greater than 400 to 1; grade 2—mitotic ratio between 400 to 1 and 100 to 1; grade 3—mitotic ratio less than 100 to 1.

In grade 1 cases a long survival period was the rule, and the 5-year survival group was nearly coincident with the grade 1 cases. Of the 6 patients with grade 1 tumors in the series, 5 were survivors with no recurrence, 4 of them for 5 years or more. The sixth patient died after 6 years, having been apparently free from recurrence for 5 years. Cases that have a poor prognosis, whatever the treatment adopted, are the following: (1) those with grade 3 histology (mitotic ratio less than 100), (2) those with grade 2 histology and pre-existing bone disease, (3) those in the older age group (over 40 or 50 years), (4) those with tumors of the axial skeleton in which adequate treatment is impossible and the diagnosis may be late, and (5) most osteolytic tumors.

The foregoing suggestions may be summarized in the following recommendations for the treatment of osteogenic sarcoma.

1. Deep x-ray therapy in high dosage, followed by local resection, should be given serious trial especially in (a) the upper limb, (b) the group with atypical clinical or roentgenographic signs, or with histology resembling that of inflammatory lesions, (c) those with grade 1 histology, and (d) the young.

2. Deep x-ray therapy followed at once by amputation should be used for osteogenic sarcoma (a) if local resection would leave a lower limb more unstable than an artificial leg, or (b) if response to x-rays is poor.

3. Deep x-ray therapy alone should be used (a) if the patient is unsuitable for, or refuses, any operation, and (b) (palliatively) if metastases are present, the tumor is too advanced, or the patient is not fit for radical treatment.

4. Amputation alone should be used palliatively, for pain or fungation when x-ray therapy has failed to give relief, or is not readily obtainable.

5. Biopsy and histological grading must be performed in every case. A histological diagnosis is most important. FRANK L. HUSSEY, M.D.

Hypoplasia of the Bone Marrow Associated with Radioactive Colloidal Gold Therapy. THOMAS W. BOTSFORD, H. BROWNELL WHEELER, ROBERT A. NEWTON, and WILLIAM E. JAQUES. *J. Am. M. Ass.*, 1953, 151: 788.

The authors recently found severe bone marrow depletion at the postmortem examination of 4 patients who had been treated with radioactive colloidal gold. None of these patients had received x-ray therapy or any drug known to depress the bone marrow, and no patient had extensive metastatic lesions in the bone.

The authors have treated a total of 23 patients with radioactive colloidal gold. Many of these patients had been treated on two or more occasions. There was no depression of the white cell count in 11 patients who were given less than 50 mc. of Au 198. Eight of this group died of their original malignant disease. In the 3 postmortem examinations done on patients of this group the bone marrow was normal. Twelve patients received Au 198 in amounts ranging from 58 mc. to 153 mc. Ten of this group have died, and 7 autopsies were performed. Four patients showed depletion of their bone marrow, and particulate material consistent with colloidal gold was demonstrated in the depleted marrow. Two other patients who underwent postmortem examination also showed bone marrow depletion but were not included in this group due to the fact they had received triethylenemelamine and x-ray therapy. The findings of focal necrosis and particles of colloidal gold in the marrow in 1 case was especially significant since this patient died only 72 hours after the injection.

The fact that 4 instances of bone marrow hypoplasia occurred among 12 patients who received doses exceeding 50 mc. of radioactive gold makes the authors conclude that it is probably a frequent side effect of this form of therapy. Whether or not this will prove a contraindication to the use of this isotope requires further experimental data and clinical appraisal. FRANK L. HUSSEY, M.D.

MISCELLANEOUS

CLINICAL ENTITIES—GENERAL PHYSIOLOGICAL CONDITIONS

Epidermoid (Epithelial) Cyst of the Hand Skeleton. ROBERT E. CARROLL. *Am. J. Surg.*, 1953, 85: 327.

For over 75 years the presence of epidermoid cysts in the soft tissues of the hand has been an accepted entity. Traumatic implantation of epidermal tissue is described as the causative agent. This type of implantation cyst, the epidermoid or epithelial cyst, also is found to exist within the substance of the phalanx of the digit. Rarely does one physician or even a hospital have the opportunity of treating a patient with such a condition. When the condition has been found, no correct preoperative diagnosis has been made by the roentgenologist or surgeon.

From the material assembled, the complete clinical and pathologic entity of the epithelial or epidermoid cyst can be appreciated. Pain and increased size of the terminal phalanx caused the patient to seek advice. These symptoms often followed a minor episode of grasping. The pressure was enough to fracture an already thin cortex. The pain was mild enough to allow the patient to wait several months before seeking advice. It did not limit the use of the hand. The majority of patients remembered specific trauma involving the affected digit. In all cases the terminal phalanx of the digit was involved.

The lesion on roentgenography is a lytic area in the terminal phalanx. It is usually round and occurs in the area of the tuft or midshaft of the phalanx. The cortex is expanded and thinned but there is no evidence of periosteal reaction. A fracture line may often be found in the thinned area of cortex. Although the history and clinical examination are of the greatest value, the diagnosis is mainly derived from the roentgenographic findings.

The most definitive treatment consists of amputation through the distal portion of the next most proximal bone. If the cyst is small, there is a good chance that curettage would be of value. Curettage may be given as the primary method of treatment if there is to be an adequate period of after-care. The wall of the cyst consists of stratified squamous cell epithelium. Sweat glands or hair follicles are never found. The cyst contains keratinized debris. Diagnosis by microscopic section should give little difficulty. W. FOSTER MONTGOMERY, M.D.

EXPERIMENTAL SURGERY

Perfusion of the Pulmonary Circulation by Nonpulsatile Flow. SIGMUND A. WESOLOWSKI, JOHN H. FISHER, and C. STUART WELCH. *Surgery*, 1953, 33: 370.

Techniques and apparatus for the nonpulsatile perfusion of an entire, intact circulation in dogs are described. The experimental data obtained indicate that during right heart by-pass, artificial maintenance of the intact pulmonary circulation is compatible with normal pulmonary function with either a pulsatile or nonpulsatile flow.

Although the number of test experiments (five) described here is small, the results are consistent. It would appear that the lesser circulation can be artificially maintained in the dog with either pulsatile or nonpulsatile flows and that either type of flow is compatible with the normal respiratory function of the lung and leads to no permanent alteration of the circulatory dynamics.

In contrast, preliminary data from 3 experiments suggest that a pulsatile flow is preferable for adequate perfusion of the greater circulation. Left heart by-pass with pulsatile perfusion of the systemic circuit for 2 hours allowed the maintenance of normal arterial blood pressure with transfusion of blood not in excess of operative losses. However, when a nonpulsatile flow was used to perfuse the systemic circulation a persistent hypotension rapidly occurred, which did not respond to the infusion of blood in amounts four times the operative losses. This hypotension was responsive to relatively small doses of neosynephrine hydrochloride. Before definite recommendations as to the type of pump outflow essential for adequate artificial maintenance of the systemic circulation can be made, further experimental data must be obtained.

W. FOSTER MONTGOMERY, M.D.

Experimental Causation of Congenital Skeletal Defects and Its Significance in Orthopedic Surgery. P. K. DURAISWAMI. *J. Bone Surg.*, 1952, 34-B: 646.

During the past few decades the discovery of genetic factors leading to congenital malformations has attracted a great deal of attention, while research in the field of environmental teratogenic factors has lagged behind. The importance of environmental causes of human malformations has not received as much emphasis as it should have.

The yolk of fertile chicken eggs was injected with solutions of crystalline insulin. The doses ranged between 0.05 and 6 units and the injections were made at varying intervals after the beginning of incubation.

Broadly speaking, insulin seemed to affect primarily the part of the body or tissue that was in the most active stage of growth or differentiation at the time of injection. Injections made the first or second days after incubation primarily affected the vertebral column. Those made on the third day affected the feet. Injections on the fourth and fifth days influenced mainly the limbs and beak. Injections with high doses of insulin (3 to 6 units) between the third and sixth day gave generalized developmental

disturbances of bones as seen in osteogenesis imperfecta, achondroplasia, chondro-osteodystrophy, and other conditions.

Within the range of 0.05 to 6 units of insulin the incidence and severity of the deformities seem to increase with the dose of the hormone. Injections of riboflavin or nicotinic acid solutions into the yolk after the injection of insulin prevented to a remarkable extent the induction of deformities caused by insulin.

The author presents this hypothesis: the development of an embryo, which is presumably guided by a succession of organizing processes, may be interfered with during critical periods by genetic or environmental teratogenic factors. Such disturbances caused to the organizer system may, in their turn, produce metabolic, biochemical, and other changes through the intervention of hormones and enzyme systems and thus interfere with the normal development of the embryo. The resulting abnormalities in development would not occur in a random assortment, but tend to fall into certain categories corresponding to the critical stages of development of susceptible tissues and the quality and intensity of the noxious agent. Developmental malformations may result not only from arrest of growth and differentiation of the embryo as a whole, or some of its parts, but also from degeneration in tissues which had developed normally up to a certain stage, as has been clearly demonstrated in the case of insulin-induced deformities and rubella-induced lenticular lesions.

This general hypothesis may be applied to congenital orthopedic deformities. It will be of interest to the orthopedic surgeon to know that it is possible to demarcate in the life of the human embryo certain critical periods which are "peculiarly associated with catastrophic changes in the development of the skeleton." The fourth and fifth weeks of intrauterine life are definitely associated with the development of the cartilage skeleton. The seventh and ninth weeks present widespread calcification of the cartilage of the long bones as the main feature. The last 2 months of fetal life are marked by rapid growth in the length of the bones, as distinct from the increase in the size of the epiphyses. The orderly progression from the mesenchymatous condensation to cartilage, and then through calcified cartilage to bone may be disturbed by genetic or environmental teratogenic factors, as explained above, and thus may result in a variety of single and multiple skeletal deformities.

A most exhaustive review of the more important work which has been carried out on experimental teratogenesis, on the epidemiological implications of developmental arrests in humans, and on fetal abnormalities associated with maternal metabolic and hormonal disorders during pregnancy is included.

EDMUND R. DONOGHUE, M.D.